Study &Evaluation Scheme

of

Bachelor of Technology (Civil Engineering)

[Applicable for Academic Session 2014-15]

[With revision approved by VC date January 11, 2017]

TEERTHANKER MAHAVEER UNIVERSITY

N.H.-24, Delhi Road, Moradabad, Uttar Pradesh-244001

Website: www.tmu.ac.in

TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)
Delhi Road, Bagarpur, Moradabad (U.P)

Study & Evaluation Scheme
Bachelor of Technology
SUMMARY

Programme : B.Tech. (Civil Engineering)

Duration : Four year full time (Eight Semesters)

Medium : English

Minimum Required Attendance : 75 %

Credit :

Maximum Credit : 194

Minimum credit required for the degree : 190

Assessment :

Internal	External	Total
30*/40**	70*/60**	100

Internal Evaluation (Theory Papers)

Class Test I	Class Test II	Class Test III	Assignment(s)	Other Activity (including attendance)	Total
Best two out of three					
10 Marks	10 Marks	10 Marks	5*/10** Marks	5*/10** Marks	30*/40** Marks

Project Phase-I :

Internal	External	Total
100	-	100

Evaluation of Practical/Industrial Training/ Project Phase-II :

Internal	External	Total
50	50	100

Duration of Examination :

External	Internal
3 hrs.	$1\frac{1}{2}$hrs

To qualify the course a student is required to secure a minimum of 40*/45**% marks in aggregate including the semester end examination and teacher's continuous evaluation (i.e. both internal and external).

A candidate who secures less than 40*/45**% of marks in a course shall be deemed to have failed in that course. The student should have at least 50*/45**% marks in aggregate to clear the semester. In case a student has secured more than 40*/45**% in each course, but less than 50*/45**% overall in a semester, he/she shall re-appear in courses where the marks are less than 40*/45**% to achieve the required aggregate percentage in the semester.

Question Paper Structure

1. *The question paper shall consist of eight questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 4 marks each).*
2. *Out of the remaining seven questions, student shall be required to attempt any five questions. There will be minimum one and maximum two questions from each unit of the syllabus. The weightage of Question No. 2 to 8 shall be 10 marks each.*
3. *Usually each question in the examination should be designed to have a numerical component.*

*upto academic session 2015-16 and **from academic session 2016-17 onwards

Study & Evaluation Scheme
Programme: B. Tech. (Civil Engineering)
Semester I

S. No	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS101	Engineering Mathematics-I	3	1	-	4	30	70	100
2	EAS102/202	Physics – I	3	-	-	3	30	70	100
	EAS103/203	Chemistry							
3	EME101/201	Engineering Mechanics	3	-	-	3	30	70	100
	EME102/202	Manufacturing Science							
4	ECS101/201	Computer Basics & C Programming	3	-	-	3	30	70	100
	EAS 104/204	Environmental Science							
5	EEE101/201	Basic Electrical Engineering	3	-	-	3	30	70	100
	EEC101/201	Basic Electronics Engineering							
6	EHM101	Foundation English-I	2	-	2	3	30	70	100
7	EAS151/251	Physics (Lab)	-	-	3	1.5	50	50	100
	EAS152/252	Chemistry (Lab)							
8	EME151/251	Engineering Mechanics (Lab)	-	-	3	1.5	50	50	100
	ECS151/251	Computer Basics & C Programming (Lab)							
9	EME152/252	Engineering Drawing (Lab)	-	-	4	2	50	50	100
	EME153/253	Workshop Practice (Lab)							
10	EEE151/251	Basic Electrical Engineering (Lab)	-	-	3	1.5	50	50	100
	EEC151/251	Basic Electronics Engineering (Lab)							
		Total	**17**	**1**	**15**	**25.5**	**380**	**620**	**1000**

Semester II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS201	Engineering Mathematics-II	3	1	-	4	30	70	100
2	EAS102/202	Physics – I	3	-	-	3	30	70	100
	EAS103/203	Chemistry							
3	EME101/201	Engineering Mechanics	3	-	-	3	30	70	100
	EME102/202	Manufacturing Science							
4	ECS101/201	Computer Basics & C Programming	3	-	-	3	30	70	100
	EAS 104/204	Environmental Science							
5	EEE101/201	Basic Electrical Engineering	3	-	-	3	30	70	100
	EEC101/201	Basic Electronics Engineering							
6	EHM201	Foundation English-II	2	-	2	3	30	70	100
7	EAS151/251	Physics (Lab)	-	-	3	1.5	50	50	100
	EAS152/252	Chemistry (Lab)							
8	EME151/251	Engineering Mechanics (Lab)	-	-	3	1.5	50	50	100
	ECS151/251	Computer Basics & C Programming (Lab)							
9	EME152/252	Engineering Drawing (Lab)	-	-	4	2	50	50	100
	EME153/253	Workshop Practice (Lab)							
10	EEE151/251	Basic Electrical Engineering (Lab)	-	-	3	1.5	50	50	100
	EEC151/251	Basic Electronics Engineering (Lab)							
		Total	**17**	**1**	**15**	**25.5**	**380**	**620**	**1000**

Study and Evaluation Scheme
Course: B.Tech. (Civil Engineering)
Semester III

S.N.	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS 301/ EAS 302	Mathematics-III/ Physics-II	3	1	0	4	30	70	100
2	ECE301/E ME405	Fluid Mechanics	3	1	0	4	30	70	100
3	ECE 302	Non-Conventional Energy Resources	3	-	0	3	30	70	100
4	EHM 303	Industrial Management	3	-	0	3	30	70	100
5	ECE 303	Surveying	3	-	0	3	30	70	100
6	ECE 304/ EME301	Strength of Materials	3	-	0	3	30	70	100
7	ECE 351	Fluid Mechanics (Lab)	0	-	3	1.5	50	50	100
8	ECE 353	Surveying (Lab)	0	-	3	1.5	50	50	100
9	ECE 354	Strength of Materials (Lab)	0	-	3	1.5	50	50	100
		Total	**18**	2	**9**	**24.5**	**330**	**570**	**900**

Additional Courses for Lateral Entry Students with B.Sc.background to be taken in III and IV semester and all should pass with minimum of 40% marks: credits will not be added

1	EME152/252	Engineering Drawing Lab	-	-	3	1.5	50	50	100
2	EME101/201 EME102/202	Engineering Mechanics	3	-	-	3	30	70	100
		Manufacturing Science							
3	EME153/253 EME151/251	Workshop Practice (Lab)	-	-	3	1.5	50	50	100
		Engineering Mechanics (Lab)							

Semester IV

SN	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	EAS 401/ EAS 402	Mathematics-III/ Physics-II	3	0	0	3	30	70	100
2	ECE 401	Building Construction & Materials	3	0	0	3	30	70	100
3	ECE 402	Concrete Technology	3	0	0	3	30	70	100
4	ECE 403	Structural Analysis – I	3	1	0	4	30	70	100
5	ECE 404	Geoinformatics	3	0	0	3	30	70	100
6	ECE 405	RCC Structure-I	3	1	0	4	30	70	100
7	ECE451	Building Construction & Materials (Lab)	0	0	3	1.5	50	50	100
8	ECE452	Concrete Technology (Lab)	0	0	3	1.5	50	50	100
9	ECE454	Geoinformatics (Lab)	0	0	3	1.5	50	50	100
		Total	**18**	**2**	**9**	**24.5**	**330**	**570**	**900**

Study and Evaluation Scheme
Course: B.Tech. (Civil Engineering)
Semester V

S.N	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	ECE 501	Steel Structure-I	3	1	0	4	40	60	100
2	ECE 502	Soil Mechanics & Engineering Geology	3	0	0	3	40	60	100
3	ECE 503	Transportation Engineering	3	0	0	3	40	60	100
4	ECE 504	Irrigation Engineering & Hydraulics	3	0	0	3	40	60	100
5	ECE 505	Structural Analysis-II	3	1	0	4	40	60	100
6	EHM 501	Technical Writing	2	0	2	3	40	60	100
7	ECE 551	Structural Analysis (Lab)	0	0	3	1.5	50	50	100
8	ECE 552	Soil Mechanics & Engineering Geology (Lab)	0	0	3	1.5	50	50	100
9	ECE 553	Transportation Engineering(Lab)	0	0	3	1.5	50	50	100
		Total	**17**	**2**	**11**	**24.5**	**390**	**510**	**900**

Semester VI

S.N	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	ECE 601	Foundation Engineering & Retaining Structures	3	0	0	3	40	60	100
2	ECE 602	Steel Structure-II	3	1	0	4	40	60	100
3	ECE 603	Public Health & Environment Engineering	3	0	0	3	40	60	100
4	ECE 604	RCC Structure-II	3	1	0	4	40	60	100
5	ECE 605	Estimation & Costing	3	0	0	3	40	60	100
6	ECE651	Foundation Engineering & Retaining Structures (Lab)	0	0	3	1.5	50	50	100
7	ECE 653	Public Health & Environment Engineering(Lab)	0	0	3	1.5	50	50	100
8	**ECE 655**	**Estimation & Costing (Lab)**	0	0	3	1.5	50	50	100
	ECE 656	**Estimation & Costing (Lab)**	0	0	3	1.5	50	50	100
9	ECE691	Survey Camp	0	0	0	3	50	50	100
		Total	**15**	**2**	**9**	**24.5**	**400**	**500**	**900**

Study & Evaluation Scheme
Course: B.Tech. (Civil Engineering)
Semester VII

S. No	*Subject Code*	*Subject*	*Periods*			*Credit*	*Evaluation Scheme*		
			L	*T*	*P*		*Internal*	*External*	*Total*
1	ECE701	Harbour, Dock & Airport Engineering	3	0	-	3	40	60	100
2	ECE702	Highway Engineering	3	-	-	3	40	60	100
3	EHM701	Managerial Economics	3	0	-	3	40	60	100
4,5	**Elective-I * –Select any two course**								
	ECE703	Industrial Pollution Control & Environmental Audit	3	-	-	3	40	60	100
	ECE704	Earthquake Resistant Structures	3	-	-	3	40	60	100
	ECE705	Irrigation Engineering & Hydrology	3	-	-	3	40	60	100
	ECE706	Rock Mechanics	3	-	-	3	40	60	100
	ECE707	Pre-stressed Concrete	3	-	-	3	40	60	100
	ECE708	Remote Sensing Applications	3	-	-	3	40	60	100
6,7	**Elective I* – Lab- Same two as selected from column above**								
	ECE753	Industrial Pollution Control & Environmental Audit	0	0	3	1.5	50	50	100
	ECE755	Irrigation Engineering & Hydrology	0	0	3	1.5	50	50	100
	ECE756	Rock Mechanics	0	0	3	1.5	50	50	100
	ECE757	Pre-stressed Concrete	0	0	3	1.5	50	50	100
	ECE758	Remote Sensing Applications	0	0	3	1.5	50	50	100
8	ECE791	Industrial Training				3	50	50	100
9	ECE799	Project Work Phase-I (Synopsis,Literature Survey &Presentation)			6	3	100	-	100
		Total	**15**	**-**	**12**	**24**	**450**	**450**	**900**

* Lab and elective subject should be same.
* Industrial Training for six weeks

Study and Evaluation Scheme
Course: B.Tech. (Civil Engineering)
Semester VIII

S.N	Subject Code	Subject	Periods			Credits	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	ECE801	Computer Aided Design (CAD)	3	0	-	3	40	60	100
	ECE810	**Advanced Computer Aided Design (CAD)**	3	0	-	3	40	60	100
2	EHM802	Project Management	3	0	-	3	40	60	100
3	ECE 851	Computer Aided Design(Lab)	0	0	3	1.5	50	50	100
	ECE 860	**Analysis and Design (Lab)**							
Elective I* - Select any one course									
4	ECE802	Hydro Power Engineering	3	0	-	3	40	60	100
	ECE803	GIS Applications	3	0	-	3			
	ECE804	Underground Structure & Tunnels	3	0	-	3			
	ECE805	Bridge Engineering	3	0	-	3			
	ECE806	Railway Engineering	3	0	-	3			
	ECE807	Groundwater Engineering	3	0	-	3			
	ECE808	Construction Practices in Difficult Ground Conditions	3	0	-	3			
	ECE809	Pavement Design	3	0	-	3			
Elective II*-Lab- Same one as selected from column above									
	ECE853	GIS Applications	0	0	3	1.5			
	ECE856	Railway Engineering	0	0	3	1.5			
	ECE859	Pavement Design	0	0	3	1.5			
6	ECE899	Project Work Phase-II (Report, Analysis, Implementation/ Simulation & Presentation)	0	0	18	9	50	50	100
		Total	**9**	**-**	**24**	**21**	**270**	**330**	**600**

Semester I

ENGINEERING MATHEMATICS-I

Course Code: EAS101	L	T	P	C
	3	1	0	4

Objective:

- To familiarize the basics of matrices, differential calculus, multiple integrals and vector calculus.
- To solve all problems related to matrices, calculus and vectors.

Course Contents

Unit I **(Lectures 08)**

Matrices: Elementary row and column transformation; Rank of matrix; Linear dependence; Consistency of linear system of equations; Characteristic equation; Cayley-Hamilton Theorem; Eigen values and Eigen vectors; Diagonalization; Complex and unitary matrices.

Unit II **(Lectures 08)**

Differential Calculus-I: Successive differentiation; Leibnitz theorem; Partial differentiation; Euler's theorem; Curve tracing; Change of variables; Expansion of function of several variables

Unit III **(Lectures 08)**

Differential Calculus–II: Jacobian; Approximation of errors; Extrema of functions of several variables; Lagrange's method of multipliers (Simple applications).

Unit IV **(Lectures 08)**

Multiple Integrals: Double and triple integral; Change of order & Change of variables; Beta and Gamma functions; Applications to area, volume; Dirichlet integral and applications.

Unit V **(Lectures 08)**

Vector Calculus: Point functions; Gradient, Divergence and Curl of a vector and their physical interpretations; Line, Surface and Volume integrals; Green's & Stokes' theorem; Gauss' divergence theorem.

Text Books

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.
2. Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya.
3. Dass H.K., Engineering Mathematics Vol-I, S. Chand.

Reference Books

1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern.
2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers.
3. Narayan Shanti, *A Text book of Matrices*, S. Chand.

Semester I/II
PHYSICS-I

Course Code: EAS102/EAS 202	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To understand the fundamentals of physics like interference, diffraction, lasers etc.

Course Contents

Unit I **(Lectures 08)**

Semiconductor Physics: Distinction among metal, insulator & semiconductor on the basis of band theory; Intrinsic and Extrinsic semiconductors; Basic concepts of Fermi level; Electron and hole mobilities; Electrical conductivity and Hall effect; Basics of p-n Junction.

Unit II **(Lectures 08)**

Interference: Basics of interference of light; coherent Sources, Conditions of Interference; Interference by division of wave front and amplitude (Fresnel's bi-prism, Newton's Rings).

Diffraction: Single and multiple slit Diffraction; Diffraction Grating; Rayleigh's criterion of resolution; Resolving Power of Telescope, Microscope and Grating.

Unit III **(Lectures 08)**

Polarization: Phenomenon of double refraction; Ordinary and extra-ordinary rays; Nicol Prism; Production and analysis of Plane, Circularly and Elliptically Polarized Light; Optical Activity; Specific Rotation, Polarimeter.

Laser: Principle of Laser action; Einstein's Coefficients; Construction and working of He-Ne and Ruby Laser.

Unit IV **(Lectures 08)**

Fiber Optics and Holography: Fundamentals of fiber optics; Types of fibers; Acceptance angle ; Numerical aperture; Attenuation, signal loss in optical fiber and dispersion; Propagation mechanism and communication in optical fiber.

Basic principle of holography; Construction of a hologram and wave reconstruction; Applications of holography.

Unit V **(Lectures 08)**

Electromagnetic: Ampère's law and displacement current; Maxwell's equations in Integral and Differential Forms; Equation of continuity; Electromagnetic Wave Propagation in Free Space and Conducting Media; Poynting Theorem.

Text Books

1. Malik K. H., *Engineering Physics*, Tata McGraw Hill.
2. Subramanyam N, *Optics*, Tata McGraw Hill.

Reference Book

1. Yadav V. S., *Engineering Physics*, Tata McGraw Hill.
2. Mehta Neeraj, *Engineering PhysicsVol. I & II*, Prentice Hall of India Pvt. Ltd.

Semester I/II
CHEMISTRY

Course Code: EAS103/EAS203	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To understand the fundamentals of chemistry like Bonding, Pollution, Polymers, Water Chemistry, etc.

Course Contents

Unit I **(Lectures 08)**

Chemical bonding & Solid State Chemistry:

Molecular theory of diatomic hetero-molecules; Band theory of bonding in metals; Hydrogen bonding; Radius Ratio Rule; Space lattice (only cubes); Type of unit cell, Bragg's Law, Calculation of Density of unit cell; One & Two Dimensional solids; graphite as two dimensional solid and its conducting properties; Fullerene & its applications.

Unit II **(Lectures 08)**

Polymers, Reaction Kinetics, Phase rule & Electrochemistry:

Structures of the following polymers, viz, Natural and synthetic rubbers, Polyamide and Polyester fibres, polymethylmethacrylate, poly acrylonitrile and polystyrene; A brief account of conducting polymers (polypyrrole & polytriphene) & their applications.

Order & Molecularity of reactions; First & Second order reactions; Energy of activation.

Phase Rule: Its application to one component system (Water). Equilibrium Potential, Introduction of electrochemical cells & Types: Galvanic & Concentration cells, Electrochemical theory of corrosion & protection of corrosion.

Unit III **(Lectures 08)**

Water Chemistry & Fuels:

Hardness of water; water softening by Lime Soda Process, Calgon process, Zeolites and ion-exchange resins; Reverse osmosis;

Classification of fuels, Coal, Biomass & Biogas; Determination of gross and net calorific values using Bomb Calorimeter.

Unit IV **(Lectures 08)**

Glass & Ceramics:

Concept of glass & its constituents; Classification & uses of different glasses; Elementary idea of manufacturing process of glass; Introduction to Ceramics materials & its constituents, Industrial application of glass & ceramics.

Unit V **(Lectures 08)**

Lubricants:

Introduction to lubricants; Mechanism of lubrication; Classification of lubricants; Flash and fire points, Selection of lubricants.

Text Books

1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.
2. Morrison & Boyd, *Organic Chemistry*, Prentice Hall
3. Chawla Shashi, Engineering Chemistry, Dhanpat Rai Publication.

Reference Books

1. Barrow Gordon M., *Physical Chemistry*, McGraw-Hill.
2. Manahan Stanley E., *Environmental Chemistry*, CRC Press.

Semester I/II
ENGINEERING MECHANICS

Course Code: EME101/EME201	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:
To study about mechanics, force system, torsion, beams, trusses, frames etc.

Course Contents

Unit I **(Lectures 08)**

Force systems and analysis: Basic concept; Newton's laws of motion; Transfer of force to a parallel position; Determination of resultant of planer force system; Free body diagrams; Equilibrium of forces and its equations.

Friction: Introduction; Coulomb's law of friction; Equilibrium of bodies involving dry fiction; Belt Friction.

Unit II **(Lectures 08)**

Structural Analysis: Beams; Introduction; Shear force and Bending Moment; shear force and Bending Moment Diagram for statically determinate beams.

Trusses: Introduction; Simple Trusses; Determination of Forces in simple trusses members; methods of joints and method of section.

Unit III **(Lectures 08)**

Centroid and Moment of Inertia: Centroid of plane; curve, area, volume and composite bodies; Moment of inertia of plane area; Parallel Axes Theorem; Perpendicular axes theorems; Principal Moment Inertia; Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their axis of symmetry

Unit IV **(Lectures 08)**

Simple stress and strain: Introduction; Normal shear stresses; stress-strain diagrams for ductile and brittle materials; Elastic constants; one dimensional loading of members of varying cross sections.

Unit V **(Lectures 08)**

Pure Bending of Beams: Introduction; Simple bending theory; Stress in Beams of different cross sections.

Torsion: Introduction; Torsion of shafts of circular section; Torque and Twist; Shear stress due to Torque.

Text Books

1. Bansal R. K., *Engineering Mechanics,* Laxmi Publications.
2. Kumar D. S., *Engineering Mechanic,*S. K. Kataria & Sons.
3. Kumar K. L., Kumar V., *Engineering Mechanics,* Tata McGraw Hill Publication.
4. Khurmi R. S., *Engineering Mechanics,* S. Chand Publications.

Reference Books

1. Shames, *Engineering Mechanics,* Prentice Hall of India Pvt. Ltd.
2. Ryder G. H., *Strength of Materials,* Macmillan Publishers India Ltd.
3. Ramamruthams, *Strength of materials,* Dhanpat Rai Publications.

Semester I/II
MANUFACTURING SCIENCE

Course Code: EME102/EME202	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To expose the students about basics of manufacturing processes as applicable in Mechanical Engineering.

Course Contents

Unit I **(Lectures 08)**

Basic Metals & Alloys: Properties and Applications; Properties of Materials: Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness, and hardness; Elementary ideas of fracture fatigue & creep.

Unit II **(Lectures 10)**

Metal Forming: Basic metal forming operations & uses of such as: Forgoing, Rolling, Wire drawing/making and Extrusion, and its products/application; Press-work; die & punch assembly, cutting and forming, its application; Hot-working versus cold-working; Introduction to Plastics: Types, Machines: Injection Moulding.

Casting: Pattern & allowance; Molding sands its desirable properties; Mould making with the use of core; Gating system, Casting defects & remedies; Cupola Furnace, Die-casting and its uses.

Unit III **(Lectures 10)**

Machining: Basic principles of Lathe-machine and operations performed on it; basic description of machines and operations of Shaper-Planner, Drilling, Milling & Grinding.

Welding: Importance & basic concepts of welding; Classification of welding processes: Gas-welding, types of flames and principle; Electric-Arc welding; Resistance welding; Soldering, & Brazing and its uses.

Unit IV **(Lectures 8)**

Unconventional ManufacturingProcess: Limitations of conventional manufacturing process; need of unconventional manufacturing processes; Basic Principles and working of unconventional manufacturing process and their applications; Electro-Discharge machining; Electro-chemical machining; Ultrasonic machining; Abrasive jet machining; Water jet machining;, Laser cutting and Laser beam welding.

Unit V **(Lectures 04)**

Super Finishing Processes: Introduction; Lapping; Honing; Buffing; Burnishing; Powder coating; Polishing

Text Books

1. Hajra & Bose, *Workshop Technology, Vol 1 & 2*, Roy Media Promoters.
2. Pandey & Singh, *Production Engineering Science*, Standard Publishers.
3. R.K. Jain, *Production technology*, Khanna publishers.

Reference Books

1. Raghuvanshi, B.S., *Workshop Technology, Vol 1 & 2*, Dhanpat Rai & Sons.
2. Laxmi Narayan & Vaish W, *A Text Book of Practical Geometrical Drawing,* Pearson Education.

Semester I/II
COMPUTER BASICS & C PROGRAMMING

Course Code: ECS101/ECS201	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To learnthe basics of computers & C programming language.

CourseContents:

Unit I **(Lectures 08)**

Concepts in Computer Application: Definition of Electronic Computer; History; Generations; Characteristics and Application of Computers; Classification of Computers; Functional Component of Computer: CPU, I/O devices, Type of Memory & Memory Hierarchy, Firmware and Humanware.

Data and data types: Definitions, data, data types: Integer, Character, Float, String, etc.; Constants and Variable Declaration; Token; Keyboard; Identifier.

Unit II **(Lectures 08)**

Programming Language Classification &Computer Languages: Generation ofLanguages; Introduction to4GLs; Translators; Assemblers; Compilers; Interpreters.

Number System: Decimal, Octal, Binary and Hexadecimal & their Conversions; Various Code: BCD, ASCII and EBCDIC and Gray Code.

Operators and Expressions: Numeric and relation operators; logical operator; bit operator; operator precedence and associatively.

Unit III **(Lectures 08)**

Internet and Web Technologies: Hypertext Markup Language;WWW; Gopher; FTP; Telnet; Web Browsers; Search Engines; Email.

Control Structure: while statement, if, else, Nested if else statement. Nested logic: for loop, do-while loop, loop inside a loop structure, Switch Statement. Break and default with switch.

Unit IV **(Lectures 08)**

Concepts in Operating Systems: Elementary Concepts in Operating Systems;Textual Vs GUI Interface.

Arrays: Notation and representation; Manipulation of array elements; Multidimensional arrays.

Unit V **(Lectures 08)**

Functions & Strings: Definition; Declaration; Call by Value; Call by Reference; Returns values and their types; Function calls

Text Books

1. Sinha P. K., *Computer Fundamentals,* BPB Publications.
2. Yadav, DS*, Foundations of IT*, New Age.
3. Curtin, *Information Technology: Breaking News*, Tata McGraw Hill.
4. Rajaraman,R, *Introduction to Computers*, Prentice Hall of India.

Reference Books

1. Peter Nortans, *Introduction to Computers*, Tata McGraw Hill.
2. Leon & Leon, *Fundamental of Information Technology*, Vikas Publishing.
3. Kanter, *Managing Information System*, Prentice-Hall.
4. CISTems*, Internet: An Introduction*, Tata McGraw Hill.

Semester I/II
ENVIRONMENTAL SCIENCE

Course Code: EAS104/EAS204	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To create awareness among students about environment protection.

Unit I **(Lectures 08)**

Introduction: Definition, Scope, Segments of Environment and its Multidisciplinary Nature; Some Major Environmental Problems; Definition and Scope of Ecology.

Unit II **(Lectures 08)**

Ecology And Environment: Concept of an Ecosystem- its components and functions; Trophic Levels- Producer; Consumer and Decomposer; Energy Flow in an Ecosystem; Biogeochemical Cycles; Food Chain; Food Web and Ecological Pyramid.

Unit III **(Lectures 08)**

Air & water pollution: Various segments of Atmosphere and their Significance; Sources and Effects of Air Pollution; Sources of Air Pollution: Photochemical Smog, Acid Rain, Global Warming, Ozone Layer - Its Depletion and Control Measures; Sources of Water Pollution; Treatment of Water Pollution; Eutrophication.

Unit IV **(Lectures 08)**

Soil & Thermal pollution: Soil pollution: Sources and Consequences; Solid Wastes – Pollution; Treatment & Disposal.

Thermal - sources and consequences; Sustainable Development; Dams and Reservoirs- Their Benefits and Problems**.**

Unit V **(Lectures 08)**

Biodiversity & its conservation

Bio-Diversity Hot-spots of Biodiversity in India and World; Conservation; Importance and Factors Responsible for Loss of Biodiversity; Deforestation- causes and effects; Biogeographical Classification of India; Environment Conservation Movement in India (Chipko Movement, Appiko Movement), Bioremediation; Biological Magnification.

Text Books

1. De A.K., *Environmental Chemistry*, New Age Publishers Pvt. Ltd.
2. Masters, G.M., *Introduction to Environmental Engineering and Science*, Prentice Hall India Pvt. Ltd.
3. Odum, E.P., *Fundamentals of Ecology*, W. B. Sannders Co.

Reference Books

1. Bryant,P.J., *Biodiversity and Conservation*, Hypertext Book.
2. Tewari, Khulbe & Tewari, *Textbook of Environment Studies*, I.K. Publication.
3. Trivedi, R.K., *Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II*, Environment Media.

Semester I/II
BASIC ELECTRICAL ENGINEERING

Course Code: EEE101/EEE201	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective

- To understand the fundamental concept of Electrical Engineering like DC Network, AC Network, Measuring Instruments, Energy Conversion Devices etc.

Course Contents

Unit I **(Lectures 08)**

D.C. Network Theory: Circuit theory concepts-Mesh and node analysis; Network Theorems-Superposition theorem, Thevenin's theorem, Norton's theorem and Maximum Power Transfer theorem; Star Delta transformation.

Unit II **(Lectures 08)**

Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and current; Single phase A.C. circuit behaviour of resistance, inductance and capacitance and their combination in series & parallel; Power factor; Series and parallel resonance; Band width and quality factor; magnetic circuit.

Unit III **(Lectures 08)**

Measuring Instruments: Construction and principles of operation of voltage and current measuring instruments; introduction to power and energy meters.
Three Phase A.C. Circuits: Star-Delta connections; Line and phase voltage/current relations; Three phase power and its measurement.

Unit IV **(Lectures 08)**

Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and voltage regulation of single phase transformer; Open and short circuit tests.
D.C. Machines: Principles of electromechanical energy conversion; Types of D.C. machines; E.M.F. equation; Magnetization and load characteristics; Losses and efficiency; Starter and speed control of D.C. Motors; Motor applications.

Unit V **(Lectures 08)**

Three phase induction Motor: Principle of operation; Types and methods of starting; slip-torque characteristics; Applications.
Synchronous Machines: Principle of Operation of Alternator and synchronous motor
Single phase Motors: Principle of operation and methods of starting of induction motor,

Text Books

1. V. Del Toro, *Principles of Electrical Engineering*, Prentice-Hall International.
2. W.H. Hayt & J.E. Kemmerly, *Engineering Circuit Analysis*, McGraw Hill.

Reference Books

1. Nagrath I.J., *Basic Electrical Engineering*, Tata McGraw Hill.
2. Fitzgerald A.E & Higginbotham ., D.E., Basic Electrical Engineering, McGraw Hill.
3. A Grabel, *Basic Electrical Engineering*, McGraw Hill.
4. Cotton H., *Advanced Electrical Technology*, Wheeler Publishing.

Semester I/II
BASIC ELECTRONICS ENGINEERING

Course Code: EEC101/EEC201	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Objective

- To understand the basic concept of Electronics Engineering like p-n Junction, Bipolar Junction Transistor, Field Effect Transistor, Operational Amplifier etc.

Course Contents

Unit I **(Lectures 08)**

p-n Junction: Properties of Elements; Crystal Structure; Energy band diagram; Introduction to PN-Junction; Depletion layer; V-I characteristics Diode Ratings (average current, peak-inverse voltage); p-n junction as rectifiers (half wave and full wave) & filter; calculation of ripple factor and load regulation; clipping and clamping circuits; Zener diode and its application as shunt regulator.

Unit II **(Lectures 08)**

Bipolar Junction Transistor (BJT): Basic construction; transistor action; CB, CE and CC configurations; input/output characteristics; Biasing of transistors: Fixed bias, emitter bias, potential divider bias; Graphical analysis of CE amplifier; concept of Voltage gain current gain; λ-parameter model (low frequency); Computation of A_i, A_v, R_i& R_o of single transistor CE amplifier configuration.

Unit III **(Lectures 08)**

Field Effect Transistor (FET): Basic construction of JFET; Principle of working; concept of pinch-off maximum drain saturation current; input and transfer characteristics; Characteristics equation; CG, CS and CD Configuration; fixed and self biasing of JFET amplifier Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction; Operation and Characteristics.

Unit IV **(Lectures 08)**

Operational Amplifier (Op-Amp): Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations; Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.

Unit V **(Lectures 08)**

Switching Theory: Number system; conversion of bases (decimal, binary, octal and hexadecimal numbers); Adder & Subtraction; BCD numbers; Seven Segment Display; Boolean Algebra; Logic gates; Concept of universal gates; Canonical forms; minimization using K-Map

Text Books

1. Robert Boylestad & Louis Nashelsky, *Electronic Circuit and Devices*, Pearson India.
2. Millman & Halkias, *Integrated Electronics*, McGraw Hill.
3. Millman & Halkias, *Electronics Devices and Circuits*, McGraw Hill.
4. Morris Mano M., *Digital Design,* Prentice Hall.

Reference Books

1. Sedra and Smith, *Microelectronic Circuits,* Oxford University Press.
2. Gayakwad, R A, *Operational Amplifiers and Linear Integrated circuits*, Prentice Hall of India Pvt. Ltd.
3. Chattopadhyay D and P C Rakshit, *Electronics Fundamentals and Applications*, New Age International.

Semester-I
FOUNDATION ENGLISH - I

Course code: EHM101	**L**	**T**	**P**	**C**
	2	**0**	**2**	**3**

(Common with BPH105/BED105/BAL101/AR107/BHM101/BFS106/BCA106/BBA106/ BCH106/ BFA103)

Course Contents:

Unit I **(Lectures 10)**

Functional Grammar: Patterns & Parts of speech Subject, Predicate, Noun, Pronoun, Adjective, Adverb, Verb, Verb phrases, Conjunction, Interjection.

Unit II **(Lectures 10)**

Vocabulary: Word formation, Prefix, Suffix, Compound words, Conversion, Synonyms, Antonyms, Homophones and Homonyms, How to look up a dictionary.

Unit III **(Lectures 10)**

Communication: Meaning & importance of communication, Barriers to effective communication, Channels of communication, Language as a tool of communication

Unit IV **(Lectures 10)**

Requisites of Sentence writing: Fragmented sentences, A good sentence, expletives, Garbled sentences, Rambling sentences, Loaded sentences, Parallel Comparison, Squinting construction, Loose & periodic sentences.

Text Books:

1. Martin & Wren - *High School English Grammar & Composition,* S.Chand & Co.
2. Lewis Norman - *Word Power made easy,* W.R.Goyal Publication & Distributors.
3. Better Your English: A Workbook for 1st year Students, Macmillan India.

Reference Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication: Principles & Practices,* Oxford University Press, New Delhi.
2. Mohan Krishna & Banerji Meera, *Developing Communication Skills,* Macmillan India Ltd.
3. Rosen Blum M., *How to Build Better Vocabulary*, Bloomsbury Publication. London.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

Semester I/II
PHYSICS (LAB)

Course Code: EAS151/EAS251	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's Biprism.
3. To determine the Specific Rotation of the Cane sugar solution with the help of Polari meter.
4. To determine the wavelength of the sodium light by Michelson's interferometer.
5. To study the PN junction characteristics.
6. To determine the high resistance by Leakage method.
7. To study the energy band gap by four probe method.
8. To study the variation of magnetic field using Stewart and Gee's apparatus.
9. To determine the frequency of A.C. mains by means of a Sonometer.
10. To study the Hall Effect.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
CHEMISTRY (LAB)

Course Code: EAS152/EAS252	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine total alkalinity in the given water sample.
2. To determine the temporary and permanent hardness in water sample using EDTA as standard solution.
3. To determine the available chlorine in bleaching powder solution.
4. To determine the chloride content in the given water sample by Mohr's method.
5. To determine the pH of the given solution using pH meter and pH-metric titration.
6. To determine the Equivalent weight of Iron by the chemical displacement method.
7. To determine the Viscosity of an addition polymer like polyester by Viscometer.
8. To determine the dissolved oxygen present in a water sample.
9. To prepare the Bakelite resin polymer.
10. To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer.
11. To determine the carbon dioxide content in polluted water sample.
12. To find chemical oxygen demand of waste water sample by potassium dichromate.
13. To determine the total hardness in water sample using complexometric method.
14. To determine the iron content in the given sample using external indicator.
15. To determine the strength of given HCL solution by titrating against N/10 Standard Sodium hydroxide solution.

Note: Minimum of 10 experiments has to be completed for completion of curriculum.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
ENGINEERING MECHANICS (LAB)

Course Code: EME151/EME251	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(Any 10 experiments of the following or such experiments suitably designed)

LIST OF EXPERIMENTS

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen.
2. To conduct the compression test and determine the ultimate compressive strength for a specimen.
3. To conduct the Impact test on Impact-testing machine to find the toughness by Charpy impact test.
4. To conduct the Impact-test on Impact-testing machine to find the toughness by Izod impact Test.
5. To determine the hardness of the given specimen using Rockwell hardness testing machine.
6. To determine the hardness of the given specimen using Brinell hardness testing machine.
7. To determine gear ratio of simple and compound gear train.
8. To determine the mechanical advantage of worm and worm wheel for load lifting.
9. To find the coefficient of friction on inclined plane.
10. To perform torsion test for rod on torsion testing machine.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
COMPUTER BASICS & C PROGRAMMING (LAB)

Course Code: ECS 151/ 251	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course Contents

1. To write a program to calculate Sum & average of N numbers.
2. To write a program to convert integer arithmetic to a given number of day and month.
3. To write a program to find maximum and minimum out of 3 numbers a, b & c.
4. To write a program to find factorial of positive integer.
5. To write a program to find sum of series up to n number, 2+5+8+……+n.
6. To write a program to print all the number between 1 to 100 which are dividing by 7.
7. To write a program to generate Fibonacci series up to n.
8. To write a program to implement a function to calculate area of a circle.
9. To write a program to implement a recursive function to calculate factorial of given number.
10. To write a program to find whether number is prime or not.
11. To write a program to find that the enter character is a letter or digit.
12. To write a program to find addition of two matrix of n*n order.
13. To write a program to find multiplication of two matrix of n*n order.
14. To write a program to add 6 digit numbers in even case & multiple 6 digit number in odd case.
15. To write a program to find even or odd up to a given limit n.
16. To write a program to find whether a given no is palindrome or not.
17. To write a program to joining & Comparing the 2 string.

Evaluation of Practical Examination:

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
ENGINEERING DRAWING (LAB)

Course Code: EME152/EME252	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

1. To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.
2. To draw the types of lines and conventions of different materials.
3. To draw and study dimensioning and Tolerance.
4. To construction geometrical figures of Pentagon and Hexagon
5. To draw the projection of points and lines
6. To draw the Orthographic Projection of given object in First Angle
7. To draw the Orthographic Projection of given object in Third Angle
8. To draw the sectional view of a given object
9. To draw the development of the lateral surface of given object
10. To draw the isometric projection of the given orthographic projection.

Reference Books

1. Bhatt. N.D., *Elementary Engineering Drawing*, Charothar Publishing.
2. Narayana K.L. & Vaish W., *A Text Book of Practical Geometry on Geometrical Drawing,* Pearson Education.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each sheet prepared would be evaluated by the faculty concerned on the date of preparing the sheet on a 5 point scale which would include the sheet drawn by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II

WORKSHOP PRACTICE (LAB)

Course Code: EME153/EME253	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

List of Experiments

Perform any ten experiments selecting at least one from each shop.

Carpentry Shop:

1. To prepare half-lap corner joint.
2. To prepare mortise & tenon joint.
3. To prepare a cylindrical pattern on woodworking lathe.

Fitting Bench Working Shop:

1. To prepare a V-joint fitting
2. To prepare a U-joint fitting
3. To prepare a internal thread in a plate with the help of tapping process

Black Smithy Shop:

1. To prepare a square rod from given circular rod

2. To prepare a square U- shapefrom given circular rod

Welding Shop:

1. To prepare a butt and Lap welded joints using arc welding machine.
2. To prepare a Lap welded joint Gas welding equipment.
3. To prepare a Lap welded joint using spot welding machine.

Sheet-metal Shop:

1. To make round duct of GI sheet using 'soldering' process.
2. To prepare a tray of GI by fabrication

Machine Shop:

1. To prepare a bolt on the lathe machine as per given. diagram
2. To prepare a job on the lathe machine as per given diagram.

Foundry Shop:

1. To prepare core as per given size.
2. To prepare a mould for given casting.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
BASIC ELECTRICAL ENGINEERING (LAB)

Course Code: EEE151/EEE251	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To verify the Kirchhoff's current and voltage laws.
2. To verify the Superposition theorem.
3. To verify the Thevenin's theorem.
4. To verify the Norton's theorem.
5. To verify the maximum power transfer theorem.
6. To determine the efficiency of single-phase transformer by load test.
7. To determine the external characteristics of DC Shunt generator.
8. To measure current and speed for speed control of D.C. Shunt Motor.
9. To measure the power in a 3-phase system by two-wattmeter method
10. To measure the power factor in an RLC by varying the capacitance.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester I/II
BASICS ELECTRONICS ENGINEERING (LAB)

Course Code: EEC151/EEC251

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

1. To study the V-I characteristics of p-n junction diode.
2. To study the diode as clipper and clamper.
3. To study the half-wave & full-wave rectifier using silicon diode.
4. To study transistor in Common Base configuration & plot its input/output characteristics.
5. To study transistor in Common Emitter configuration & plot its input/output characteristics. .
6. To study the operational amplifier in inverting & non inverting modes using IC 741.
7. To study the operational amplifier as differentiator & integrator.
8. To study the Zener diode as a shunt regulator.
9. To study various logic gates & verify their truth tables.
10. To study half adder/full adder & verify their truth tables.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II
ENGINEERING MATHEMATICS- II

Course Code: EAS201	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: To familiarize the basic concept of Differential Equations, Laplace Transform, Fourier series and Partial Differential Equations etc.

Course Contents

Unit I **(Lectures 08)**

Differential Equations: Ordinary differential equations of first order; Exact differential equations; Linear differential equations of first order, Linear differential equations of nth order with constant coefficients; Complementary functions and particular integrals; Simultaneous linear differential equations; Solutions of second order differential equations by changing dependent and independent variables; Method of variation of parameters; Applications to engineering problems (without derivation).

Unit II **(Lectures 08)**

Series Solutions and Special Functions: Series solutions of ODE of 2nd order with variable coefficients with special emphasis to differential equations of Legendre and Bessel; Legendre polynomials; Bessel's functions and their properties.

Unit III **(Lectures 10)**

Partial Differential Equations and applications: Introduction of partial differential equations; Linear partial differential equations with constant coefficients of 2nd order and their classifications – parabolic; elliptic and hyperbolic with illustrative examples.

Method of separation of variables for solving partial differential equations; Wave equation up to two dimensions; Laplace equation in two-dimensions; Heat conduction equations up to two-dimensions; Equations of transmission Lines.

Unit IV **(Lectures 06)**

Fourier Series: Periodic functions, Trigonometric series; Fourier series; Euler's formulae; Even and odd functions, Half range sine and cosine series.

Unit V **(Lectures 08)**

Laplace Transform: Laplace transform; Existence theorem; Laplace transform of derivatives and integrals; Inverse Laplace transform; Unit step function; Diracth delta function; Laplace transform of periodic functions; Convolution theorem; Application to solve simple linear and simultaneous differential equations.

Text Books

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.
2. Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya.
3. Das H.K., *Engineering Mathematics Vol-II*, S. Chand.

Reference Books

1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern.
2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers.
3.Narayan Shanti, *A Text book of Matrices*, S. Chand
4.Bali N.P., *Engineering Mathematics-II,* Laxmi Publications.

Semester II/I
PHYSICS-I

Course Code: EAS202/EAS102	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To understand the fundamentals of physics like interference, diffraction, lasers etc.

Course Contents

Unit I **(Lectures 08)**

Semiconductor Physics: Distinction among metal, insulator & semiconductor on the basis of band theory; Intrinsic and Extrinsic semiconductors; Basic concepts of Fermi level; Electron and hole mobilities; Electrical conductivity and Hall effect; Basics of p-n Junction.

Unit II **(Lectures 08)**

Interference: Basics of interference of light; coherent Sources, Conditions of Interference; Interference by division of wave front and amplitude (Fresnel's bi-prism, Newton's Rings).

Diffraction: Single and multiple slit Diffraction; Diffraction Grating; Rayleigh's criterion of resolution; Resolving Power of Telescope, Microscope and Grating.

Unit III **(Lectures 08)**

Polarization: Phenomenon of double refraction; Ordinary and extra-ordinary rays; Nicol Prism; Production and analysis of Plane, Circularly and Elliptically Polarized Light; Optical Activity; Specific Rotation, Polarimeter.

Laser: Principle of Laser action; Einstein's Coefficients; Construction and working of He-Ne and Ruby Laser.

Unit IV **(Lectures 08)**

Fiber Optics and Holography: Fundamentals of fiber optics; Types of fibers; Acceptance angle ; Numerical aperture; Attenuation, signal loss in optical fiber and dispersion; Propagation mechanism and communication in optical fiber.

Basic principle of holography; Construction of a hologram and wave reconstruction; Applications of holography.

Unit V **(Lectures 08)**

Electromagnetics: Ampère's law and displacement current; Maxwell's equations in Integral and Differential Forms; Equation of continuity; Electromagnetic Wave Propagation in Free Space and Conducting Media; Poynting Theorem.

Text Books

1. Malik K. H., *Engineering Physics*, Tata McGraw Hill.
2. Subramanyam N, *Optics*, Tata McGraw Hill.

Reference Book

1. Yadav V. S., *Engineering Physics*, Tata McGraw Hill.
2. Mehta Neeraj, *Engineering PhysicsVol. I & II*, Prentice Hall of India Pvt. Ltd.

Semester II/I
CHEMISTRY

Course Code: EAS203/EAS103	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To understand the fundamentals of chemistry like Bonding, Pollution, Polymers, Water Chemistry, etc.

Course Contents

Unit I **(Lectures 08)**

Chemical bonding & Solid State Chemistry:

Molecular theory of diatomic hetero-molecules; Band theory of bonding in metals; Hydrogen bonding; Radius Ratio Rule; Space lattice (only cubes); Type of unit cell, Bragg's Law, Calculation of Density of unit cell; One & Two Dimensional solids; graphite as two dimensional solid and its conducting properties; Fullerene & its applications.

Unit II **(Lectures 08)**

Polymers, Reaction Kinetics, Phase rule & Electrochemistry:

Structures of the following polymers, viz, Natural and synthetic rubbers, Polyamide and Polyester fibres, polymethylmethacrylate, poly acrylonitrile and polystyrene; A brief account of conducting polymers (polypyrrole & polytriphene) & their applications.

Order & Molecularity of reactions; First & Second order reactions; Energy of activation.

Phase Rule: Its application to one component system (Water). Equilibrium Potential, Introduction of electrochemical cells & Types: Galvanic & Concentration cells, Electrochemical theory of corrosion & protection of corrosion.

Unit III **(Lectures 08)**

Water Chemistry & Fuels:

Hardness of water; water softening by Lime Soda Process, Calgon process, Zeolites and ion-exchange resins; Reverse osmosis;

Classification of fuels, Coal, Biomass & Biogas; Determination of gross and net calorific values using Bomb Calorimeter.

Unit IV **(Lectures 08)**

Glass & Ceramics:

Concept of glass & its constituents; Classification & uses of different glasses; Elementary idea of manufacturing process of glass; Introduction to Ceramics materials & its constituents, Industrial application of glass & ceramics.

Unit V **(Lectures 08)**

Lubricants:

Introduction to lubricants; Mechanism of lubrication; Classification of lubricants; Flash and fire points, Selection of lubricants.

Text Books

1. Agarwal R. K., Engineering Chemistry, Krishna Prakashan.
2. Morrison & Boyd, *Organic Chemistry*, Prentice Hall
3. Chawla Shashi, Engineering Chemistry, Dhanpat Rai Publication.

Reference Books

1. Barrow Gordon M., *Physical Chemistry*, McGraw-Hill.
2. Manahan Stanley E., *Environmental Chemistry*, CRC Press.

Semester II/I
ENGINEERING MECHANICS

Course Code: EME201/EME101	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:
To study about mechanics, force system, torsion, beams, trusses, frames etc.

Course Contents

Unit I **(Lectures 08)**

Force systems and analysis: Basic concept; Newton's laws of motion; Transfer of force to a parallel position; Determination of resultant of planer force system; Free body diagrams; Equilibrium of forces and its equations.

Friction: Introduction; Coulomb's law of friction; Equilibrium of bodies involving dry fiction; Belt Friction.

Unit II **(Lectures 08)**

Structural Analysis: Beams; Introduction; Shear force and Bending Moment; shear force and Bending Moment Diagram for statically determinate beams.

Trusses: Introduction; Simple Trusses; Determination of Forces in simple trusses members; methods of joints and method of section.

Unit III **(Lectures 08)**

Centroid and Moment of Inertia: Centroid of plane; curve, area, volume and composite bodies; Moment of inertia of plane area; Parallel Axes Theorem; Perpendicular axes theorems; Principal Moment Inertia; Mass Moment of Inertia of Circular Ring, Disc, Cylinder, Sphere and Cone about their axis of symmetry

Unit IV **(Lectures 08)**

Simple stress and strain: Introduction; Normal shear stresses; stress-strain diagrams for ductile and brittle materials; Elastic constants; one dimensional loading of members of varying cross sections.

Unit V **(Lectures 08)**

Pure Bending of Beams: Introduction; Simple bending theory; Stress in Beams of different cross sections.

Torsion: Introduction; Torsion of shafts of circular section; Torque and Twist; Shear stress due to Torque.

Text Books

1. Bansal R. K., *Engineering Mechanics,* Laxmi Publications.
2. Kumar D. S., *Engineering Mechanic,*S. K. Kataria & Sons.
3. Kumar K. L., Kumar V., *Engineering Mechanics,* Tata McGraw Hill Publication.
4. Khurmi R. S., *Engineering Mechanics,* S. Chand Publications.

Reference Books

1. Shames, *Engineering Mechanics,* Prentice Hall of India Pvt. Ltd.
2. Ryder G. H., *Strength of Materials,* Macmillan Publishers India Ltd.
3. Ramamruthams, *Strength of materials,* Dhanpat Rai Publications.

Semester II/I
MANUFACTURING SCIENCE

Course Code: EME202/EME102	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To expose the students about basics of manufacturing processes as applicable in Mechanical Engineering.

Course Contents

Unit I **(Lectures 08)**

Basic Metals & Alloys: Properties and Applications; Properties of Materials: Strength, elasticity, stiffness, malleability, ductility, brittleness, toughness, and hardness; Elementary ideas of fracture fatigue & creep.

Unit II **(Lectures 10)**

Metal Forming: Basic metal forming operations & uses of such as: Forgoing, Rolling, Wire drawing/making and Extrusion, and its products/application; Press-work; die & punch assembly, cutting and forming, its application; Hot-working versus cold-working; Introduction to Plastics: Types, Machines: Injection Moulding.

Casting: Pattern & allowance; Molding sands its desirable properties; Mould making with the use of core; Gating system, Casting defects & remedies; Cupola Furnace, Die-casting and its uses.

Unit III **(Lectures 10)**

Machining: Basic principles of Lathe-machine and operations performed on it; basic description of machines and operations of Shaper-Planner, Drilling, Milling & Grinding.

Welding: Importance & basic concepts of welding; Classification of welding processes: Gas-welding, types of flames and principle; Electric-Arc welding; Resistance welding; Soldering, & Brazing and its uses.

Unit IV **(Lectures 8)**

Unconventional ManufacturingProcess: Limitations of conventional manufacturing process; need of unconventional manufacturing processes; Basic Principles and working of unconventional manufacturing process and their applications; Electro-Discharge machining; Electro-chemical machining; Ultrasonic machining; Abrasive jet machining; Water jet machining;, Laser cutting and Laser beam welding.

Unit V **(Lectures 04)**

Super Finishing Processes: Introduction; Lapping; Honing; Buffing; Burnishing; Powder coating; Polishing

Text Books

1. Hajra & Bose, *Workshop Technology, Vol 1 & 2*, Roy Media Promoters.
2. Pandey & Singh, *Production Engineering Science*, Standard Publishers.
3. R.K. Jain, *Production technology*, Khanna publishers.

Reference Books

1. Raghuvanshi, B.S., *Workshop Technology, Vol 1 & 2*, Dhanpat Rai & Sons.
2. Laxmi Narayan & Vaish W, *A Text Book of Practical Geometrical Drawing,* Pearson Education.

Semester II/I
COMPUTER BASICS & C PROGRAMMING

Course Code: ECS201/ECS101	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective:

- To learnthe basics of computers & C programming language.

CourseContents:

Unit I **(Lectures 08)**

Concepts in Computer Application: Definition of Electronic Computer; History; Generations; Characteristics and Application of Computers; Classification of Computers; Functional Component of Computer: CPU, I/O devices, Type of Memory & Memory Hierarchy, Firmware and Humanware.

Data and data types: Definitions, data, data types: Integer, Character, Float, String, etc.; Constants and Variable Declaration; Token; Keyboard; Identifier.

Unit II **(Lectures 08)**

Programming Language Classification &Computer Languages: Generation ofLanguages; Introduction to4GLs; Translators; Assemblers; Compilers; Interpreters.

Number System: Decimal, Octal, Binary and Hexadecimal & their Conversions; Various Code: BCD, ASCII and EBCDIC and Gray Code.

Operators and Expressions: Numeric and relation operators; logical operator; bit operator; operator precedence and associativity.

Unit III **(Lectures 08)**

Internet and Web Technologies: Hypertext Markup Language;WWW; Gopher; FTP; Telnet; Web Browsers; Search Engines; Email.

Control Structure: while statement, if, else, Nested if else statement. Nested logic: for loop, do-while loop, loop inside a loop structure, Switch Statement. Break and default with switch.

Unit IV **(Lectures 08)**

Concepts in Operating Systems: Elementary Concepts in Operating Systems;Textual Vs GUI Interface.

Arrays: Notation and representation; Manipulation of array elements; Multidimensional arrays.

Unit V **(Lectures 08)**

Functions & Strings: Definition; Declaration; Call by Value; Call by Reference; Returns values and their types; Function calls

Text Books

1. Sinha P. K., *Computer Fundamentals,* BPB Publications.
2. Yadav, DS*, Foundations of IT*, New Age.
3. Curtin, *Information Technology: Breaking News*, Tata McGraw Hill.
4. Rajaraman,R, *Introduction to Computers*, Prentice Hall of India.

Reference Books

1. Peter Nortans, *Introduction to Computers*, Tata McGraw Hill.
2. Leon & Leon, *Fundamental of Information Technology*, Vikas Publishing.
3. Kanter, *Managing Information System*, Prentice-Hall.
4. CISTems*, Internet: An Introduction*, Tata McGraw Hill.

Semester II/I
ENVIRONMENTAL SCIENCE

Course Code: EAS204/EAS104	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To create awareness among students about environment protection.

Unit I **(Lectures 08)**

Introduction: Definition, Scope, Segments of Environment and its Multidisciplinary Nature; Some Major Environmental Problems; Definition and Scope of Ecology.

Unit II **(Lectures 08)**

Ecology And Environment: Concept of an Ecosystem- its components and functions; Trophic Levels- Producer; Consumer and Decomposer; Energy Flow in an Ecosystem; Biogeochemical Cycles; Food Chain; Food Web and Ecological Pyramid.

Unit III **(Lectures 08)**

Air & water pollution: Various segments of Atmosphere and their Significance; Sources and Effects of Air Pollution; Sources of Air Pollution: Photochemical Smog, Acid Rain, Global Warming, Ozone Layer - Its Depletion and Control Measures; Sources of Water Pollution; Treatment of Water Pollution; Eutrophication.

Unit IV **(Lectures 08)**

Soil & Thermal pollution: Soil pollution: Sources and Consequences; Solid Wastes – Pollution; Treatment & Disposal.

Thermal - sources and consequences; Sustainable Development; Dams and Reservoirs- Their Benefits and Problems**.**

Unit V **(Lectures 08)**

Biodiversity & its conservation

Bio-Diversity Hot-spots of Biodiversity in India and World; Conservation; Importance and Factors Responsible for Loss of Biodiversity; Deforestation- causes and effects; Biogeographical Classification of India; Environment Conservation Movement in India (Chipko Movement, Appiko Movement), Bioremediation; Biological Magnification.

Text Books

1. De A.K., *Environmental Chemistry*, New Age Publishers Pvt. Ltd.
2. Masters, G.M., *Introduction to Environmental Engineering and Science*, Prentice Hall India Pvt. Ltd.
3. Odum, E.P., *Fundamentals of Ecology*, W. B. Sannders Co.

Reference Books

1. Bryant,P.J., *Biodiversity and Conservation*, Hypertext Book.
2. Tewari, Khulbe & Tewari, *Textbook of Environment Studies*, I.K. Publication.
3. Trivedi, R.K., *Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol I and II*, Environment Media.

Semester II/I
BASIC ELECTRICAL ENGINEERING

Course Code: EEE201/EEE101	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective

- To understand the fundamental concept of Electrical Engineering like DC Network, AC Network, Measuring Instruments, Energy Conversion Devices etc.

Course Contents

Unit I **(Lectures 08)**

D.C. Network Theory: Circuit theory concepts-Mesh and node analysis; Network Theorems-Superposition theorem, Thevenin's theorem, Norton's theorem and Maximum Power Transfer theorem; Star Delta transformation.

Unit II **(Lectures 08)**

Steady State Analysis of A.C. Circuits: Sinusoidal and phasor representation of voltage and current; Single phase A.C. circuit behaviour of resistance, inductance and capacitance and their combination in series & parallel; Power factor; Series and parallel resonance; Band width and quality factor; magnetic circuit.

Unit III **(Lectures 08)**

Measuring Instruments: Construction and principles of operation of voltage and current measuring instruments; introduction to power and energy meters.
Three Phase A.C. Circuits: Star-Delta connections; Line and phase voltage/current relations; Three phase power and its measurement.

Unit IV **(Lectures 08)**

Transformer: Principle of operation; Types of construction; Phasor diagram; Equivalent circuit; Efficiency and voltage regulation of single phase transformer; Open and short circuit tests.
D.C. Machines: Principles of electromechanical energy conversion; Types of D.C. machines; E.M.F. equation; Magnetization and load characteristics; Losses and efficiency; Starter and speed control of D.C. Motors; Motor applications.

Unit V **(Lectures 08)**

Three phase induction Motor: Principle of operation; Types and methods of starting; slip-torque characteristics; Applications.
Synchronous Machines: Principle of Operation of Alternator and synchronous motor
Single phase Motors: Principle of operation and methods of starting of induction motor,

Text Books

1. V. Del Toro, *Principles of Electrical Engineering*, Prentice-Hall International.
2. W.H. Hayt & J.E. Kemmerly, *Engineering Circuit Analysis*, McGraw Hill.

Reference Books

1. Nagrath I.J., *Basic Electrical Engineering*, Tata McGraw Hill.
2. Fitzgerald A.E & Higginbotham, D.E., Basic Electrical Engineering, McGraw Hill.
3. A Grabel, *Basic Electrical Engineering*, McGraw Hill.
4. Cotton H., *Advanced Electrical Technology*, Wheeler Publishing.

Semester II/I
BASIC ELECTRONICS ENGINEERING

Course Code: EEC201/EEC101	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Objective

- To understand the basic concept of Electronics Engineering like p-n Junction, Bipolar Junction Transistor, Field Effect Transistor, Operational Amplifier etc.

Course Contents

Unit I **(Lectures 08)**

p-n Junction: Properties of Elements; Crystal Structure; Energy band diagram; Introduction to PN-Junction; Depletion layer; V-I characteristics Diode Ratings (average current, peak-inverse voltage); p-n junction as rectifiers (half wave and full wave) & filter; calculation of ripple factor and load regulation; clipping and clamping circuits; Zener diode and its application as shunt regulator.

Unit II **(Lectures 08)**

Bipolar Junction Transistor (BJT): Basic construction; transistor action; CB, CE and CC configurations; input/output characteristics; Biasing of transistors: Fixed bias, emitter bias, potential divider bias; Graphical analysis of CE amplifier; concept of Voltage gain current gain; λ-parameter model (low frequency); Computation of A_i, A_v, R_i& R_o of single transistor CE amplifier configuration.

Unit III **(Lectures 08)**

Field Effect Transistor (FET): Basic construction of JFET; Principle of working; concept of pinch-off maximum drain saturation current; input and transfer characteristics; Characteristics equation; CG, CS and CD Configuration; fixed and self biasing of JFET amplifier Introduction of MOSFET; Depletion and Enhancement type MOSFET- Construction; Operation and Characteristics.

Unit IV **(Lectures 08)**

Operational Amplifier (Op-Amp): Concept of ideal operational amplifier; ideal and practical Op-Amp parameters; inverting, non-inverting and unity gain configurations; Applications of Op-Amp as adders, difference amplifiers, integrators and differentiator.

Unit V **(Lectures 08)**

Switching Theory: Number system; conversion of bases (decimal, binary, octal and hexadecimal numbers); Adder & Subtraction; BCD numbers; Seven Segment Display; Boolean Algebra; Logic gates; Concept of universal gates; Canonical forms; minimization using K-Map

Text Books

1. Robert Boylestad & Louis Nashelsky, *Electronic Circuit and Devices*, Pearson India.
2. Millman & Halkias, *Integrated Electronics*, McGraw Hill.
3. Millman & Halkias, *Electronics Devices and Circuits*, McGraw Hill.
4. Morris Mano M., *Digital Design,* Prentice Hall.

Reference Books

1. Sedra and Smith, *Microelectronic Circuits,* Oxford University Press.
2. Gayakwad, R A, *Operational Amplifiers and Linear Integrated circuits*, Prentice Hall of India Pvt. Ltd.
3. Chattopadhyay D and P C Rakshit, *Electronics Fundamentals and Applications*, New Age International.

Semester-II
FOUNDATION ENGLISH - II

Course code: EHM 201	**L**	**T**	**P**	**C**
	2	**0**	**2**	**3**

(Common with BPH206/BBA206/BCA206/BHM201/AR207/BCH206/BFA203)

Unit I **(Lectures 10)**

Functional Grammar: Articles, Preposition, Tenses: Functions, Synthesis, Transformation, Spotting errors and correction of sentences.

Unit II **(Lectures 10)**

Pre- Requisites of Technical written Communication: One word substitution, Spelling rules, Words often confused & misused, Phrases.

Unit III **(Lectures 10)**

The Structure of sentences/ clauses: Adverb clause, Adjective clause, Noun clause. Sentences: Simple, Double, Multiple and complex, Transformation of sentences: simple to complex & vice versa, simple to compound & vice-versa, Interrogative to assertive & negative & vice-versa.

Unit IV **(Lectures 10)**

Technical Communication: Nature, Origin and Development, Salient features, Scope & Significance, Forms of Technical Communication, Difference between Technical Communication & General writing, Objective Style vs. Literary Composition

Text-Books:

1. Wren & Martin, *High School English Grammar & Composition* – S. Chand & Co.
2. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice,* Oxford University Press, New Delhi, 2007.
3. Mitra Barum K., *Effective Technical Communication,* Oxford University Press, New Delhi.
4. Better Your English- A Workbook for 1st year Students- Macmillan India.

Reference Books:

1. Horn A.S., *Guide to Patterns & Usage in English,* Oxford University Press, New Delhi.

NOTE:

This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

Semester II/I
PHYSICS (LAB)

Course Code: EAS251/EAS151	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine the wavelength of Sodium light by Newton's rings.
2. To determine the wavelength of Sodium light by Fresnel's Biprism.
3. To determine the Specific Rotation of the Cane sugar solution with the help of Polari meter.
4. To determine the wavelength of the sodium light by Michelson's interferometer.
5. To study the PN junction characteristics.
6. To determine the high resistance by Leakage method.
7. To study the energy band gap by four probe method.
8. To study the variation of magnetic field using Stewart and Gee's apparatus.
9. To determine the frequency of A.C. mains by means of a Sonometer.
10. To study the Hall Effect.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
CHEMISTRY (LAB)

Course Code: EAS252/EAS152	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine total alkalinity in the given water sample.
2. To determine the temporary and permanent hardness in water sample using EDTA as standard solution.
3. To determine the available chlorine in bleaching powder solution.
4. To determine the chloride content in the given water sample by Mohr's method.
5. To determine the pH of the given solution using pH meter and pH-metric titration.
6. To determine the Equivalent weight of Iron by the chemical displacement method.
7. To determine the Viscosity of an addition polymer like polyester by Viscometer.
8. To determine the dissolved oxygen present in a water sample.
9. To prepare the Bakelite resin polymer.
10. To determine the viscosity of a given sample of a lubricating oil using Redwood Viscometer.
11. To determine the carbon dioxide content in polluted water sample.
12. To find chemical oxygen demand of waste water sample by potassium dichromate.
13. To determine the total hardness in water sample using complexometric method.
14. To determine the iron content in the given sample using external indicator.
15. To determine the strength of given HCL solution by titrating against N/10 Standard Sodium hydroxide solution.

Note: Minimum of 10 experiments has to be completed for completion of curriculum.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
ENGINEERING MECHANICS (LAB)

Course Code: EME251/EME151	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

(Any 10 experiments of the following or such experiments suitably designed)

LIST OF EXPERIMENTS

1. To conduct the tensile test and determine the ultimate tensile strength, percentage elongation for a steel specimen.
2. To conduct the compression test and determine the ultimate compressive strength for a specimen.
3. To conduct the Impact test on Impact-testing machine to find the toughness by Charpy impact test.
4. To conduct the Impact-test on Impact-testing machine to find the toughness by Izod impact Test.
5. To determine the hardness of the given specimen using Rockwell hardness testing machine.
6. To determine the hardness of the given specimen using Brinell hardness testing machine.
7. To determine gear ratio of simple and compound gear train.
8. To determine the mechanical advantage of worm and worm wheel for load lifting.
9. To find the coefficient of friction on inclined plane.
10. To perform torsion test for rod on torsion testing machine.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
COMPUTER BASICS & C PROGRAMMING (LAB)

Course Code: ECS 251/ 151	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Course Contents

1. To write a program to calculate Sum & average of N numbers.
2. To write a program to convert integer arithmetic to a given number of day and month.
3. To write a program to find maximum and minimum out of 3 numbers a, b & c.
4. To write a program to find factorial of positive integer.
5. To write a program to find sum of series up to n number, 2+5+8+……+n.
6. To write a program to print all the number between 1 to 100 which are dividing by 7.
7. To write a program to generate Fibonacci series up to n.
8. To write a program to implement a function to calculate area of a circle.
9. To write a program to implement a recursive function to calculate factorial of given number.
10. To write a program to find whether number is prime or not.
11. To write a program to find that the enter character is a letter or digit.
12. To write a program to find addition of two matrix of n*n order.
13. To write a program to find multiplication of two matrix of n*n order.
14. To write a program to add 6 digit numbers in even case & multiple 6 digit number in odd case.
15. To write a program to find even or odd up to a given limit n.
16. To write a program to find whether a given no is palindrome or not.
17. To write a program to joining & Comparing the 2 string.

Evaluation of Practical Examination:

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
ENGINEERING DRAWING (LAB)

Course Code: EME252/EME152	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

1. To write all Numbers (0 to 9) and alphabetical Letters (A to Z) as per the standard dimensions.
2. To draw the types of lines and conventions of different materials.
3. To draw and study dimensioning and Tolerance.
4. To construction geometrical figures of Pentagon and Hexagon
5. To draw the projection of points and lines
6. To draw the Orthographic Projection of given object in First Angle
7. To draw the Orthographic Projection of given object in Third Angle
8. To draw the sectional view of a given object
9. To draw the development of the lateral surface of given object
10. To draw the isometric projection of the given orthographic projection.

Reference Books

1. Bhatt. N.D., *Elementary Engineering Drawing*, Charothar Publishing.
2. Narayana K.L. & Vaish W., *A Text Book of Practical Geometry on Geometrical Drawing,* Pearson Education.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each sheet prepared would be evaluated by the faculty concerned on the date of preparing the sheet on a 5 point scale which would include the sheet drawn by the students and a Viva voce taken by the faculty concerned. The marks shall be entered on the index sheet.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I

WORKSHOP PRACTICE (LAB)

Course Code: EME253/EME153	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

List of Experiments

Perform any ten experiments selecting at least one from each shop.

Carpentry Shop:

1. To prepare half-lap corner joint.
2. To prepare mortise & tenon joint.
3. To prepare a cylindrical pattern on woodworking lathe.

Fitting Bench Working Shop:

1. To prepare a V-joint fitting
2. To prepare a U-joint fitting
3. To prepare a internal thread in a plate with the help of tapping process

Black Smithy Shop:

1. To prepare a square rod from given circular rod

2. To prepare a square U- shapefrom given circular rod

Welding Shop:

1. To prepare a butt and Lap welded joints using arc welding machine.
2. To prepare a Lap welded joint Gas welding equipment.
3. To prepare a Lap welded joint using spot welding machine.

Sheet-metal Shop:

1. To make round duct of GI sheet using 'soldering' process.
2. To prepare a tray of GI by fabrication

Machine Shop:

1. To prepare a bolt on the lathe machine as per given. diagram
2. To prepare a job on the lathe machine as per given diagram.

Foundry Shop:

1. To prepare core as per given size.
2. To prepare a mould for given casting.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
BASIC ELECTRICAL ENGINEERING (LAB)

Course Code: EEE251/EEE151	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To verify the Kirchhoff's current and voltage laws.
2. To verify the Superposition theorem.
3. To verify the Thevenin's theorem.
4. To verify the Norton's theorem.
5. To verify the maximum power transfer theorem.
6. To determine the efficiency of single-phase transformer by load test.
7. To determine the external characteristics of DC Shunt generator.
8. To measure current and speed for speed control of D.C. Shunt Motor.
9. To measure the power in a 3-phase system by two-wattmeter method
10. To measure the power factor in an RLC by varying the capacitance.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester II/I
BASICS ELECTRONICS ENGINEERING (LAB)

Course Code: EEC251/EEC151	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To study the V-I characteristics of p-n junction diode.
2. To study the diode as clipper and clamper.
3. To study the half-wave & full-wave rectifier using silicon diode.
4. To study transistor in Common Base configuration & plot its input/output characteristics.
5. To study transistor in Common Emitter configuration & plot its input/output characteristics.
6. To study the operational amplifier in inverting & non inverting modes using IC 741.
7. To study the operational amplifier as differentiator & integrator.
8. To study the Zener diode as a shunt regulator.
9. To study various logic gates & verify their truth tables.
10. To study half adder/full adder & verify their truth tables.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III
MATHEMATICS-III

Course Code: EAS301/EAS 401	L	T	P	C
	3	1	0	4

Unit I **(Lectures 08)**

*Integral Transforms:*Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations.
Z – Transform and its application to solve difference equations.

Unit II **(Lectures 08)**

Functions of a Complex Variable: Analytic functions; C-R equations and harmonic functions; Line integral in the complex plane; Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions; Liouvilles theorem.

Unit III **(Lectures 08)**

Functions of a Complex Variable II: Representation of a function by power series; Taylor's and Laurent's series; Singularities, zeroes and poles; Residue theorem, evaluation of real integrals; conformal mapping and bilinear transformations.

Unit IV **(Lectures 08)**

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve Fitting and Solution of Equations: Method of least squares and curve fitting of straight line and parabola, Solution of cubic and bi-quadratic equations, Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution.

Unit V **(Lectures 08)**

Numerical Technique: Bisection method, Regula – Falsi method, Newton - Raphson method.
Interpolation: Finite difference, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals; Numerical Differentiation, Numerical Integration; Trapezoidal, Simpson's 1/3 and 3/8 rule.

Text Books

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.
2. Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya.
3. Das H.K., *Engineering MathematicsVol-II*, S. Chand.

Reference Books

1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern.
2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers.
3.Narayan Shanti, *A Text book of Matrices*, S. Chand.
4.Bali N.P., *Engineering Mathematics-III,* Laxmi Publications.

Semester III
PHYSICS II

Course Code: EAS302/EAS 402	L	T	P	C
	3	1	0	4

Objective: To understand modern physics like nanotechnology, cryogenics etc.

Course Contents

Unit I **(Lectures 08)**

Relativistic Mechanics: Inertial and Non- inertial Frames; Michelson-Morley Experiment; Postulates of Special Theory of Relativity; Galilean and Lorentz Transformation; Length Contraction and Time Dilation; Addition of Velocities; Mass Energy Equivalence and Variation of Mass with Velocity.

Unit II **(Lectures 08)**

Modern Physics: Bragg's Law; Compton Effect; Wave Particle Duality; De Broglie matter wave; Davisson and Germer's Experiment; Phase and Group velocities; Uncertainty Principle and application.

Unit III **(Lectures 08)**

Quantum Mechanics II : Physical Interpretation of Wave Function and its Normalization; Expectation Value; Schrodinger Equation in One Dimension; Solutions of Time-Independent Schrodinger Equation for Free Particle; Particle in an Infinite Square Well; Potential Barrier and Tunneling; Hydrogen atom (qualitative

Unit IV **(Lectures 08)**

Superconductivity: Temperature dependence of resistivity; Meissner effect; Penetration depth; Type I and Type II superconductors; Temperature dependence of critical filed; BCS theory of superconductors; applications of superconductors.

Introduction to Nanomaterials: Basic principles of nanoscience and technology; creation and use of buckyballs; properties and use of carbon nanotubes; applications of nanomaterials.

Unit V **(Lectures 08)**

Vacuum Physics: Mean free path; rotary and diffusion pumps; Pirani and Penning Gauges.

Nuclear Physics: Nuclear Forces; Binding Energy; Liquid Drop Model; Fission; Nuclear Reactors; Fusion and Energy Processes in Stars, Controlled Thermonuclear Reactions.

Text Books:

1. Robert Resmick, *Introduction to Special Theory of Relativity*, Wiley.
2. A. Beiser, *Perspectives of Modern Physics*, McGraw Hill.
3. R. Booker and E. Boysen, *Nanotechnology*, Wiley.
4. G. G. Haselden, *Cryogenic Fundamentals*, Academic Press.

Semester III

FLUID MECHANICS

Course Code: ECE 301/EME 405	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: To make the students aware about the basics of fluid mechanics

Unit I **(Lectures 08)**

Introduction: Fluid and continuum; Physical properties of fluids: Viscosity, compressibility, Surface Tension, Capillarity, Vapour pressure; Cavitations; Classification of fluids including rheological classification.

Fluid Statics: Pascal's Law; Pressure-density-height relationship; Pressure on plane and curved surfaces; The Hydrostatic law; Total Pressure and Centre of pressure; Buoyancy; Stability of immersed and floating bodies; Measurement of pressure by manometers and mechanical gauges.

Unit II **(Lectures 08)**

Types of fluid flows- Steady and unsteady, Uniform and non-uniform, Laminar and Turbulent flows, 1, 2, and 3-D flows; Stream lines, Path lines and streak lines; Laminar Flow- Equation of motion for laminar flow through pipes; Stokes law; Turbulent Flow- Equation for turbulent flow; Eddy viscosity; Mixing concept and velocity distribution in turbulent flow; Stream tube; Acceleration of a fluid particles along a straight and curved path; Differential and Integral form of Continuity equation; Rotation, Vortices and Circulation; Elementary explanation of Stream function and Velocity potential; Flow net characteristics.

Unit III **(Lectures 08)**

Fluid Dynamics-I: Introduction to Navier - Stokes equations; Euler's equation of motion along a streamline, Bernoulli's equation and its applications; Pitot tube; Flow through Orifices; Mouthpieces; Nozzles; Notches; Wires; Free and Forced vortex motion.

Unit IV **(Lectures 08)**

Fluid Dynamics-II: Pipe bends problems related to combined application of energy and momentum equations; Determination of coefficients of discharge; Velocity and contraction and energy loss; Equation for velocity distribution over smooth and rough surfaces; Concept of equivalent length; Branched pipes; Pipes in series and parallel; Flow in sudden expansion and contraction; water hammer.

Unit V **(Lectures 08)**

Boundary Layer Analysis: Boundary layer thickness; Boundary layer over a flat plate; Laminar layer; Application of Von-Kármán integral Momentum Equation; Turbulent boundary layer; Laminar sub-layer; Hydro-dynamically smooth and rough boundaries; Local and average friction coefficient; Total drag; Boundary layer separation and its control.

Text Books:

1. R J Fox, *Introduction to Fluid Mechanics,*
2. Hunter Rouse John Wiley and Sons, *Elementary Mechanics of Fluids*, Omc/1946
3. L H Shames *Mechanics of Fluids*, McGraw Hill, International Student Edition.

Reference Books:

*1.*Grade.R J and A G Mirajgaonkar , *Engineering Fluid Mechanics (Including Hydrualic Machines)* Nemchand and Bros, Roorkee, 1983

2.K L Kumar ,*Engineering Fluid Mechanics*

3.Bruce R.Donald F Young and T H Okishi, *Fundamentals of Fluid Mechanics*, Munson, Wiley Lastern

4.V Gupta and S K Gupta, *Fluid Mechanics and its applications*, Wiley Eastern Ltd
5.Som and Biswas, *Introduction to Fluid Mechanics and Machines,* TMH
6.K Banal , *Fluid Mechanics and Hydraulic Machines*
7.Modi and Seth, *Fluid Mechanics and Fluid Machines*

Semester III
NON-CONVENTIONAL ENERGY RESOURCES

Course Code: ECE 302

L	T	P	C
3	0	0	3

Objective: To make the students aware about the types of turbines & site selection for installation of various types of power plants

Unit I **(Lectures 08)**

Introduction: World energy use; Reserves of energy resources; Energy cycle of the earth; Environmental aspects of energy utilization; Renewable energy resources and their importance.

Unit II **(Lectures 08)**

Solar Energy: Introduction; Extraterrestrial solar radiation; Radiation at ground level; Collectors; Solar cells; Applications of solar energy.

Biomass Energy: Introduction; Biomass Conversion; Biogas Production; Ethanol Production; Pyrolysis and Gasification; Direct Combustion; Applications.

Unit III **(Lectures 08)**

Wind, Geo-Thermal and Hydro Energy Sources: Introduction; Basic theory; Types of turbines; Geothermal Energy Resources; Resource based applications for heating and electricity generation; Hydropower basic concepts; Site selection; Types of turbines; Small scale hydropower.

Unit IV **(Lectures 08)**

Tidal Energy: Introduction; Origin of tides; Power generation schemes; Basic theory of Wave energy; Wave power Devices; Open and Closed OTEC cycles.

Unit V **(Lectures 08)**

Other Renewable Energy Sources: Ocean Currents; Salinity Gradient Devices; Environmental Aspects; Potential impacts of harnessing the different renewable energy resources.

Text Books:

1. G D Rai, *Non Conventional Energy Sources*, Khanna publishers

Reference Books:

1. A.Duffie and W.A.Beckmann, *"Solar Engineering of Thermal Processes"*, John Wiley (1980)
2. F.Kreith and J.F.Kreider, *"Principles of Solar Engineering"*, McGraw-Hill (1978)
3. T.N.Veziroglu, *"Alternative Energy Sources, Vol. 5 and 6"*, McGraw-Hill (1978)

Semester III
INDUSTRIAL MANAGEMENT

Course Code: EHM303

L	T	P	C
3	0	0	3

Objective: To develop the managerial skills among the students.

Unit I **(Lectures 08)**

General Management: Principles of scientific management; Brief description of managerial functions.

Business Organizations: Salient features of sole Proprietorship, Partnership, Joint stock company – private and public limited.

Unit II **(Lectures 08)**

Financial Management: Concept of interest; Compound interest; Equivalent cash flow diagram; Economic Evaluation of Alternatives - Annual equivalent method, Present worth method, Future worth method.

Depreciation – purpose, Types of Depreciation; Common methods of depreciation - Straight line method, Declining balance method, Sum of the years digits method.

Unit III **(Lectures 08)**

Personnel Management: Leadership and motivation; Staff role of the personnel department; Personnel functions; Organizational structure.

Job Design and Analysis: Job analysis; Job design; Job information and personnel management; Analyzing jobs; Obtaining job information; Functional job analysis.

Human Resource Planning: Reasons for human resource planning; Planning process; Goals and plans of the organizations; Implementation programs; Brief description of recruitment, selection, placement, performance appraisal, career development, promotion, transfer, retirement, training and development, motivation and compensation.

Unit IV **(Lectures 08)**

Material Management: Importance; Definition, Objectives, Procedure of purchasing, Source selection, Vendor rating and Value analysis; Scope of MRP.

Inventory Control: Definition, objectives, reasons, and requirements for inventory management; Inventory methods - ABC Analysis, VED, XYZ and Cost information.

Economic Order Quantity models - Basic EOQ, Economic production run size and Quantity discounts.

Unit V **(Lectures 08)**

Marketing Management: Functions of Marketing; Product life cycle; Channels of distribution; Advertising & sales promotion; Market Research.

Managing Marketing Effort: Marketing implementation and evaluation; Appraisal and prospects.

Text books:

1. K. K. Ahuja, *"Industrial Management",* Vol. I & II,
2. William G.Sullivan, E.Paul Degarmo, R. Chandra, *"Engineering Economy"*. John Wiley

Reference Books:

1. Philip Kotler, *'Principles of Marketing Management'*
2. Gopalkrishna, *'Materials Management'*
3. Koontz & Weirich, *'Management'*

Semester III
SURVEYING

Course Code: ECE 303

L	T	P	C
3	0	0	3

Objective: To make the students aware about the principles & methods of surveying

Unit I **(Lectures08)**

Introduction: Importance of surveying; Examples from different fields; Classification of surveys - Plane and Geodetic Surveying; Control Points; Methods of locating a point; Sources and Types of errors, Principles of surveying.

Measurement of Distances: Working Principles of different methods and their accuracies; Measurement by chain and tape; Sources of errors and precautions; Corrections to tape measurements; Field problems; Introduction of modern trends - EDM and Total Stations; Measurement by laser.

Unit II **(Lectures 08)**

Measurements of Angles and Directions

Compass Surveying: Reference meridians; Bearing and azimuths; Magnetic declination and its variations; Use and adjustment of compass.

Theodolite Surveying: Vernier theodolite; Micro-optic and electronic theodolites - Temporary and permanent adjustments, Measurement of horizontal and vertical angles.

Unit III **(Lectures 08)**

Traversing: Principles of traversing by compass and theodolite; Plotting of traverse surveying; Traverse computation; Computation of coordinates - latitude and departure; Closing error; Balancing the traverse - Bowditch's method, transit method, graphical method and the axis method.

Omitted measurements: Consecutive coordinates& numerical problems.

Unit IV **(Lectures 08)**

Leveling: Definition; Terms used in leveling; Types of leveling; Level and setting up of level; Dumpy level - Temporary adjustment of a dumpy; Types of leveling staff; Methods of leveling - Rise and Fall method & Height of collimation method.

Contouring: Definition and characteristics of contours; Direct and Indirect methods of contouring and plotting; Interpolation of contours; Use of contour maps; Digital Elevation Model.

Unit V **(Lectures 08)**

Plane Table Surveying: Principle; Plane Table equipments & accessories; Use of telescopic and self-reducing alidades; Different methods of Plane Table Surveying; Advantages and disadvantages of Plane Table surveying.

Sheet Numbering; Scales and numbering of Indian topographic maps.

Text Books:

1. Agor, R, *"Surveying"*, Vol. I & II. Khanna Publications, Delhi.
2. Arora, K.R., *"Surveying"*, Vol. I & II Standard Book House, Delhi.

Reference Books:

1. Bannister, A. and Baker, R., *"Solving Problems in Surveying"*, Longman Scientific Technical, U.K.,
2. Kennie, T.J.M. and Petrie, G., *"Engineering Surveying Technology"*, Blackie & Sons Ltd., London, 1990.
3. Punmia, B.C., *"Surveying"*, Vol. I & II, Laxmi Publications New Delhi,
4. Duggal, S.K., *"Surveying"*, Vol. I & II TMH

5. Basak, *"Surveying"*, TMH.
6. Kanetkar, *"Surveying"*, Vol. I, II,
7. Chandra, A.M., *"Plane Surveying"*, New Age International Publishers, Delhi
8. Chandra, A.M., *"Higher Surveying"*, New Age International Publishers, Delhi

Semester III

STRENGTH OF MATERIALS

CourseCode: ECE304 / EME301

L	T	P	C
3	0	0	3

Objective: Theobjectiveisto gain knowledge ofstresses and deformation in components as to enable the students to design all types of structures and machines.

Unit I **(Lectures 08)**

Review: Review ofsimpleandcompoundstresses; Mohr'sCircle;1-D &3-D stresses; Theoriesoffailure; Castingliono's Theorem;Impactload;Threedimensionalstateofstress&strain; Equilibriumequations; GeneralizedHook's Law.

Unit II **(Lectures08)**

StressesinBeams: ReviewofpureBending;Directandshearstressesinbeams;Compositebeams;
DeflectionofBeams: Equationofelasticcurve;Cantilever,simplysupported, fixedand continuous beams; Methods of Deflection calculation - Macauly's method, Areamomentmethod.

UnitIII **(Lectures08)**

HelicalandLeafSprings: Deflectionofspringsbyenergymethod;Helicalsprings of circular and square cross-section under axial load and axial twist; Simultaneous action of axial load and twisting moment uponopen andclosed coiledsprings; laminated springs.
ColumnsandStruts: Combinedbending anddirectstresses; Middlethirdandquarterrules;Strutswith differentendconditions.

Unit IV **(Lectures 08)**

ThinCylinders&Spheres: Hoopandaxialstressesandstrains;Volumetricstrain.
ThickCylinders: Thick and compound cylinders - Radial, axialandcircumferential stresses; Stressdue to interferencefits.

Unit V **(Lectures08)**

Curved Beams:Bending ofbeamswithlarge initialcurvature; Positionofneutralaxis forrectangular, trapezoidalandcircularcrosssections; Stressesincranehooks; Stressesincircularringssubjectedtotensionor compression.
UnsymmetricalBending: Propertiesofbeams,cross-sections;Slopeofneutralaxis;
Stressanddeflectionin unsymmetricalbending; Determinationofshearcenterandflexuralaxisfor I-section and channel-section.

Text Books

1. Ryder, *StrengthofMaterials*, Singer
2. Timoshenko and Timoshenko & Yóung,*Strength ofMaterials*,

ReferenceBooks

1. BearJhonson*, Mechanics of Materials*. S Chand Publication, New Delhi
2. RajputR.K,*Strength ofMaterials*.
3. Ramamrutham& Narain*"StrengthofMaterials*. Dhanpat Rai Publ., New Delhi
4. Kazami, *Advanced MechanicsofSolids*,TMH

Semester III
FLUID MECHANICS (LAB)

Course Code: ECE 351

L	T	P	C
0	0	3	1.5

Objective: To determine various parameters used in fluid mechanics.

LIST OF EXPERIMENT

1. To verify the Bernoulli's theorem.
2. To calibrate the Venturimeter.
3. To calibrate the Orificemeter.
4. To determine meta-centric height of a floating body.
5. To determine Cc, Cv, Cd of an orifice.
6. To determine Cd of a mouthpiece.
7. To determine Cd of a V-notch.
8. To determine viscosity of a given fluid.
9. To study the velocity distribution in an open channel with current meter.
10. To measure discharge in open channel by area-velocity method.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III
SURVEYING (LAB)

Course Code: ECE 353

L	T	P	C
0	0	3	1.5

Objective: To make the students aware about various methods of surveying.

LIST OF EXPERIMENTS

1. To locate offset along a chain line.
2. Plotting of Building Block by offset with the help of chain surveying.
3. To determine the magnetic bearing of a line with prismatic compass/ using surveyor's compass.
4. To determine the bearing of traverse line by with prismatic compass and adjustment of closing error by graphical method.
5. Measurement and adjustment of included angles of traverse using prismatic compass.
6. To locate the objects from a single station using radiation method (Plane table survey).
7. To locate the objects using Intersection method (Plane table survey).
8. To determine the reduced levels using Dumpy Level.
9. To carry out profile leveling and plot longitudinal and cross sections for road.
10. To carryout temporary adjustment of Theodolite.
11. To determine the horizontal and vertical angles using Transit Theodolite/ Electronic Theodolite

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester III
STRENGTH OF MATERIALS (LAB)

Course Code: ECE 354

L	T	P	C
0	0	3	1.5

Objective: To make the Engineering students aware about the various methods of testing the strength of materials

LIST OF EXPERIMENT

1. To determine the tensile strength of given mild steel sample.
2. To determine bending stress on (Steel/Wood) cantilever beam.
3. To determine the modulus of rigidity of a given mild steel sample.
4. To determine the hardness of a given mild steel sample.
5. To determine the stiffness of given helical spring.
6. To determine the bending stress on simple supported beam.
7. To determine the compressive strength of wood.
8. To determine the shearing strength of given mild steel sample.
9. To determine the impact value (Izod & Charpy method) of given mild steel sample.
10. To measure the deflection of continuous beam.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV/III
MATHEMATICS-III

Course Code: EAS401/EAS 301	L	T	P	C
	3	1	0	4

Unit I **(Lectures 08)**

*Integral Transforms:*Fourier integral, Fourier complex transform, Fourier sine and cosine transforms and applications to simple heat transfer equations.
Z – Transform and its application to solve difference equations.

Unit II **(Lectures 08)**

Functions of a Complex Variable: Analytic functions; C-R equations and harmonic functions; Line integral in the complex plane; Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic functions; Liouvilles theorem.

Unit III **(Lectures 08)**

Functions of a Complex Variable II: Representation of a function by power series; Taylor's and Laurent's series; Singularities, zeroes and poles; Residue theorem, evaluation of real integrals; conformal mapping and bilinear transformations.

Unit IV **(Lectures 08)**

Statistical Techniques: Moments, Moment generating functions, Skewness, Kurtosis, Curve Fitting and Solution of Equations: Method of least squares and curve fitting of straight line and parabola, Solution of cubic and bi-quadratic equations, Correlation and Regression, Binomial distribution, Poisson distribution, Normal distribution.

Unit V **(Lectures 08)**

Numerical Technique: Bisection method, Regula – Falsi method, Newton - Raphson method.
Interpolation: Finite difference, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals; Numerical Differentiation, Numerical Integration; Trapezoidal, Simpson's 1/3 and 3/8 rule.

Text Books

1. Grewal B.S., *Higher Engineering Mathematics*, Khanna Publishers.
2. Prasad C., *Engineering Mathematics for Engineers*, Prasad Mudralaya.
3. Das H.K., *Engineering MathematicsVol-II*, S. Chand.

Reference Books

1. Kreyszig E., *Advanced Engineering Mathematics*, Wiley Eastern.
2. Piskunov N, *Differential & Integral Calculus*, Moscow Peace Publishers.
3.Narayan Shanti, *A Text book of Matrices*, S. Chand.
4.Bali N.P., *Engineering Mathematics-III,* Laxmi Publications.

Semester IV/III
PHYSICS II

Course Code: EAS402/EAS 302	L	T	P	C
	3	1	0	4

Objective: To understand modern physics like nanotechnology, cryogenics etc.

Course Contents

Unit I **(Lectures 08)**

Relativistic Mechanics: Inertial and Non- inertial Frames; Michelson-Morley Experiment; Postulates of Special Theory of Relativity; Galilean and Lorentz Transformation; Length Contraction and Time Dilation; Addition of Velocities; Mass Energy Equivalence and Variation of Mass with Velocity.

Unit II **(Lectures 08)**

Modern Physics: Bragg's Law; Compton Effect; Wave Particle Duality; De Broglie matter wave; Davisson and Germer's Experiment; Phase and Group velocities; Uncertainty Principle and application.

Unit III **(Lectures 08)**

Quantum Mechanics II : Physical Interpretation of Wave Function and its Normalization; Expectation Value; Schrodinger Equation in One Dimension; Solutions of Time-Independent Schrodinger Equation for Free Particle; Particle in an Infinite Square Well; Potential Barrier and Tunneling; Hydrogen atom (qualitative

Unit IV **(Lectures 08)**

Superconductivity: Temperature dependence of resistivity; Meissner effect; Penetration depth; Type I and Type II superconductors; Temperature dependence of critical filed; BCS theory of superconductors; applications of superconductors.

Introduction to Nanomaterials: Basic principles of nanoscience and technology; creation and use of buckyballs; properties and use of carbon nanotubes; applications of nanomaterials.

Unit V **(Lectures 08)**

Vacuum Physics: Mean free path; rotary and diffusion pumps; Pirani and Penning Gauges.

Nuclear Physics: Nuclear Forces; Binding Energy; Liquid Drop Model; Fission; Nuclear Reactors; Fusion and Energy Processes in Stars, Controlled Thermonuclear Reactions.

Text Books:

1. Robert Resmick, *Introduction to Special Theory of Relativity*, Wiley.
2. A. Beiser, *Perspectives of Modern Physics*, McGraw Hill.
3. R. Booker and E. Boysen, *Nanotechnology*, Wiley.
4. G. G. Haselden, *Cryogenic Fundamentals*, Academic Press.

Semester IV
BUILDING CONSTRUCTION AND MATERIALS

Course Code: ECE 401

L	T	P	C
3	0	0	3

Objective: To make the students aware about the properties of materials used in construction.

Unit I **(Lectures 08)**

Stones and Bricks: Properties of building stones – relation to their structural requirements; Classification of stones; Stone quarrying ; Precautions in blasting; Dressing of stone.
Composition of good brick earth; Various methods of manufacture of bricks; Qualities of a good brick; Comparison between clamp burning and kiln burning.

Unit II **(Lectures 08)**

Tiles: Characteristics of tiles; Types of tiles; Manufacturing methods. Other Building Materials like aluminum, gypsum, glass, Bitumin etc.

Unit III **(Lectures 08)**

Lime, Cement and Concrete: Classification of lime; Various ingredients of lime; Constituents of lime stone; Methods of manufacture of lime.
Cement - types and properties; Laboratory tests for Cement.
Ingredients of cement concrete and their importance; Tests for concrete.

Unit IV **(Lectures 08)**

Wood: Wood – Properties, Structures, Classification; Seasoning of timber; Defects in timber. Alternative materials for wood - Galvanized Iron, Fiber-reinforced plastics, steel & Aluminum, glass.

Unit V **(Lectures 08)**

Masonry: Definition & types of masonry; Rubble masonry; Ashlar masonry; English and Flemish bonds; Cavity and partition walls.
Foundations: Shallow foundations – Spread, Combined strap and Mat footings.
Dampness Control & Anti-termite measures.

Text Books.

1. S K Duggal, *"Building material"*, New Age International Publishers; Second Edition
2. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, *"Building Construction"*, Laxmi Publications (P) LTD. New Delhi
3. P.C. Varghese, *"Building Construction"*, Prentice-Hall of India private Ltd, New Delhi
4. Sushil Kumar, *"Building Construction"*,
5. Sushil Kumar, *"Building Material"*,
6. National Building Code

Reference Books:

1. R.Chudly, *"Construction Technology– Volumes I and II"*, Longman, UK, 1987.
2. P.C. Varghese, *"Building Materials"*, Prentice-Hall of India private Ltd, New Delhi

Semester IV
CONCRETE TECHNOLOGY

Course Code: ECE 402

L	T	P	C
3	0	0	3

Objective: To provide the knowledge of concrete and its constituents to the students.

Unit I **(Lectures 08)**

Cements & Admixtures: Portland cement – chemical composition, Hydration, Setting of cement; Structure of hydrate cement; Tests of physical properties; Different grades of cement; Admixtures – Mineral and chemical admixtures.

Unit II **(Lectures 08)**

Aggregates: Classification of aggregate; Particle shape & texture; Bond; Strength & other mechanical properties of aggregate – Specific gravity, Bulk density, Porosity, Adsorption & Moisture content; Bulking of sand; Deleterious substance in aggregate; Soundness of aggregate; Alkali aggregate reaction; Thermal properties; Sieve analysis; Fineness modulus; Grading curves – Grading of fine & coarse Aggregates; Gap graded aggregate; Maximum aggregate size.

Unit III **(Lectures 08)**

Fresh Concrete: Workability; Factors affecting workability; Measurement of workability by different tests; Setting times of concrete; Segregation & bleeding; Mixing and vibration of concrete; Steps in manufacture of concrete; Quality of mixing water.

Special Concretes: Light weight aggregates; Light weight aggregate concrete; Cellular concrete; No-fines concrete; High density concrete; Fiber-reinforced concrete (F.R.C.); Different types of fibers; Factors affecting properties of F.R.C.; Applications of F.R.C.; Polymer concrete – Types, Properties and Applications; High performance concrete; Self consolidating concrete; SIFCON.

Unit IV **(Lectures 08)**

Hardened Concrete: Water /Cement ratio; Curing; Abram's Law; Nature of strength of concrete; Maturity concept; Strength in tension & compression; Factors affecting strength.

Mix Design: Factors in the choice of mix proportions; Durability of concrete; Quality Control of concrete – Statistical methods; Acceptance criteria; Proportioning of concrete mixes by various methods.

Unit V **(Lectures 08)**

Testing of Hardened Concrete: Tests for Compression, Tension, Flexure, Splitting; Non-destructive testing methods; Codal provisions for NDT.

Elasticity - Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio.

Creep & Shrinkage: Creep and its Nature; Factors influencing creep; Relation between creep & time; Effects of creep; Shrinkage and types of shrinkage.

Text Books:

1. A.M.Neville, *"Properties of Concrete"*, Low priced Edition
2. M.S.Shetty., *"Concrete Technology"*, S.Chand & Co; 2004

Reference Books:

1. M.L. Gambhir., *"Concrete Technology"*, Tata Mc. Graw Hill Publishers, New Delhi
2. A.R. Santha Kumar, *"Concrete Technology"*, Oxford University Press, New Delhi

Semester IV
STRUCTURAL ANALYSIS – I

Course Code: ECE 403

L	T	P	C
3	1	0	4

Objective: To provide knowledge to the students about basics of structural analysis.

Unit I **(Lectures 08)**

Introduction- Statically determinate and indeterminate structures, Condition of equilibrium, compatibility conditions.

Fixed beams & continuous beams

Analysis of fixed beams, Continuous beams- Clapeyron's theorem of three moments, fixed ends of continuous beams, supports at different level.

Unit II **(Lectures 08)**

Work done by force on a member, Maxwell's reciprocal deflection theorem, Betti's Law, The first theorem of Castigliano, Principle of virtual work for deflections, deflection of pin jointed plane frames.

Unit III **(Lectures 08)**

Moving loads and Influence lines – Influence lines for reactions in statically determinate structures, Influence lines for shear force and bending moment in simply supported and overhangs beams, Maximum bending moment and Absolute Maximum bending moment under a chosen wheel load & uniformly distributed live load, Influence line diagrams for bridge truss members.

Unit IV **(Lectures 08)**

Slope Deflection Method- Continuous beams and rigid frames (with and without sway), Symmetry and anti-symmetry - Simplification for hinged end - Support displacements.

Unit V **(Lectures 08)**

Moment Distribution Method: Distribution and carry-over of moments, Stiffness and carry over factors - Analysis of continuous beams with sinking of supports, Single Storey Portal frames with and without sway.

Text Books:

1. S Ramamruthan & R Narayan*, Theory of structures- -Dhanpat Rai & publishing companies*
2. S S Bhavikatti, *"Structural Analysis-II"*, Vikas Publishing House Pvt Ltd.

Reference Books:

1. C K Wang, *"Analysis of Indeterminate Structures",* - Tata McGraw-Hill
2. P.Dayaratnam., *"Theory of Structures"*,

Semester IV
GEOINFORMATICS

Course Code: ECE 404

L	T	P	C
3	0	0	3

Objective: To make the students aware about the current technologies/methods of surveying and exploration.

Unit I **(Lectures 08)**

Remote Sensing: Introduction; Electromagnetic spectrum; Energy in electromagnetic waves; Interaction of electromagnetic waves with matter; Effect of atmosphere on electromagnetic radiation; Electromagnetic wave interaction with earth surface features; Sensing Systems – sensors, platforms, data acquisition and interpretation; Resolution concept in remote sensing; Application of remote sensing in civil engineering.

Unit II **(Lectures 08)**

Photogrammetry: Introduction; Aerial photography - Definitions and mathematical relationships; Type of aerial photographs; Comparison of Aerial photograph with Map; Advantages and limitation of air photo interpretation.
Stereoscopic vision; Different types of stereoscopes; Stereo model.
Ground control; Aerial Triangulation; Visual Interpretation; Computer techniques in image interpretation.

Unit III **(Lectures 08)**

Geographic Information System: Introduction; Subsystems of GIS; Hardware of GIS; Data for GIS; Representation of Features; Data Structure for GIS; Vector vs. Raster Data Structures; Data format conversions; Capabilities/Functionalities of GIS; Map Overlay Analysis; Data Quality; Sources of errors in GIS; Applications of GIS; Selective GIS Software.

Unit IV **(Lectures 08)**

Global Positioning Systems: Overview; Satellite Constellation; Equipment Segment; Principle of Position Determination via Satellite Generated Ranging Signals; GPS Surveying Techniques; GPS Accuracy; Uses and Applications of GPS

Unit V **(Lectures 08)**

Electromagnetic Distance Measurement (EDM): Introduction; Electromagnetic waves; Modulation; EDM Instruments - Geodimeters, Tellurometers, Distomats; Total Station.

Text Books:

1. S K Duggal, *"Surveying"*, vol.2 Tata McGraw Hill publications,2009
2. Dr B C Punmia, *"Surveying, Vol. II and III,* Laxmi Publications, 1971.

Reference Books:

1. Clark D, *"Plane and Geodetic Surveying, Vols. I and II"*, C.B.S. Publishers and Distributions, Delhi.
2. M L Jhanwar & T S Chouhan, *Remote Sensing & Photogrammetry, vol.I,* Vigyan Prakashan, Jhodhpur
3. Wolf P R., *"Elements of Photogrammetry"*, McGraw-Hill Book Company, 1986.
4. Robinson A H., Sale R D Morrison J L and Muehrche P C., *"Elements of Cartography"*, John Wiley and Sons, New York , 1984.
5. Heribert Kahmen and Wolfgang Faig, *"Surveying"*, Walter de Gruyter, 1995.
6. Kanetkar T P., *"Surveying and Leveling, Vols. I and II"*United Book Corporation, Pune, 1994.

Semester V
RCC STRUCTURE I

Course Code: ECE 405

L	T	P	C
3	1	0	4

Objective: To make the students aware about designing methods of RCC structures.

Unit I **(Lectures 08)**
Design Methods – Working Stress Method, Ultimate Design Method, Limit State Design Method; Design of Rectangular Singly and Doubly Reinforced Beams by Working Stress Method.

Unit II **(Lectures 08)**
Limit State Design Method – Assumptions, Design of Rectangular Singly and Doubly Reinforced Beams.

Unit III **(Lectures 08)**
Behaviour of RCC beam in Shear; Shear Strength of beams with and without shear reinforcement; Minimum and Maximum shear reinforcement; Design of beam in shear.
Development Length - Anchorage bond, flexural bond, Failure of beam under shear, Concept of Equivalent Shear and Moments.

Unit IV **(Lectures 08)**
Design of one way and two way solid slabs by Limit State Design Method; Serviceability Limit States; Control of deflection, cracking, influence of vibrations.

Unit V **(Lectures 08)**
Design of Columns by Limit State Design Method - Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending, Design of columns under bi-axial loading by Design Charts.

Text Books:
1. IS: 456 – 2000.
2. A. K. Jain, *"Reinforced Concrete – Limit State Design"*, Nem Chand & Bros., Roorkee.
3. P. Dayaratnam. *"Reinforced Concrete Design"*,

Reference Books:
1. O. P. Jain & Jai Krishna, *"Plain and Reinforced Concrete Vol. I & II"*, Nem Chand & Bros.
2. R. Park and Pauley., *"Reinforced Concrete Structures"*,
3. S. Unnikrishna Pillai & D. Menon, *"Reinforced Concrete Design"*, Tata Mc-Graw Hill Book Publishing Company Limited, New Delhi.
4. A K Jain, *"Plain and Reinforced Concrete (Limited State Design)"*, New Chand & Bros. Roorkee

Semester IV
BUILDING CONSTRUCTION & MATERIALS (LAB)

Course Code: ECE 451

L	T	P	C
0	0	3	1.5

Objective: To make the students aware about the various methods of testing of construction materials

A course of laboratory experiments of construction materials. The list of experiments is as follows.

1. To determine the water absorption capacity of bricks.
2. To determine the compressive strength of bricks
3. To measure dimensions of bricks (Dimension test)
4. To determine the water absorption capacity of aggregates.
5. To determine the specific gravity of aggregates
6. To determine the flakiness and elongation index of aggregates.
7. To determine the abrasion value of aggregates by Los-Angeles apparatus.
8. To determine the abrasion value of aggregates by Impact Test machine.
9. To determine the soundness of aggregates.
10. Layout of building as per given plan.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)			ATTENDANCE (5 MARKS)	QUIZ (5 MARKS)	VIVA (10 MARKS)	TOTAL INTERNAL (50 MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)				

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV
CONCRETE TECHNOLOGY (LAB)

Course Code: ECE 452	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Objective: To make the students aware about the various methods of testing the important properties of concrete.

TESTS ON CEMENT:

1. To determine the normal consistency of fineness of cement.
2. To determine the initial and final setting times of cement.
3. To determine the specific gravity of cement.
4. To determine the soundness of cement.
5. To determine the compressive strength of cement.
6. Workability of concrete by slump test
7. Workability of concrete by Vee-bee consistometer.
8. To determine the compressive strength of concrete.
9. To determine of Bulking of sand.
10. To demonstrate various non-destructive tests on concrete.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (10 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester IV
GEOINFORMATICS (LAB)

Course Code: ECE 454	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

Objective: To make the students aware about the various methods advanced techniques of surveying.

LIST OF EXPERIMENTS

1. To read and study topo sheets of Survey of India.
2. To interpret the aerial photographs using pocket stereo scope.
3. To determine the reduce level by auto level.
4. To carry out temporary adjustment of Theodolite.
5. To measure the horizontal angle using Theodolite.
6. To determine the height of wall using Theodolite.
7. To calculate the internal angle in close traversing using Theodolite.
8. To carry out the general study of GPS.
9. To find the location and tracking of the position or object using the GPS.
10. Demonstration & study of total station.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (30 MARKS)</td><td rowspan="2">ATTENDANCE (5 MARKS)</td><td rowspan="2">QUIZ (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
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</table>

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester V

STEEL STRUCTURE- I

Course Code: ECE 501	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: To provide knowledge about the use of steel in structures.

Unit-I **(Lecture 08)**

Introduction : Steel as structural material; Various grades of structural steel; Properties of various rolled steel sections; Structural pipes; Introduction to various Codes - IS: 800, 875, 808, 816 etc.; Philosophy of limit state design- limit state of strength & serviceability Structural Fasteners; Riveted & bolted connections & their advantages and disadvantages; Welded connection; Types of weld - butt & filled welds; IS Code requirements.

Unit-II **(Lecture 08)**

Design of tension members: Types of members; Net sectional area of plates, net effective areas for angles and tees in tension, permissible stresses, design of members subjected to axial tension

Unit III **(Lecture 08)**

Design of compression members: Effective length of columns, slenderness ratio, permissible stresses, Design of compression members. Design of single rolled steel columns subjected to axial loads & moments. Design of axially loaded built up columns. Design of lacings & battens. Column splices.

Unit IV **(Lecture 08)**

Design of flexural members: Beams Bending stress, shear stress, bearing stress, deflection, design of laterally supported beam, laterally unsupported beam, web crippling, web buckling, Built-up beams, design of symmetrically plated beams, curtailment of flange plates,

Unit V **(Lecture 08)**

Design of column bases and footings: Slab base, gusseted base, moment resistant bases for columns, attached bas plate with initially tensioned bolts, attached base with untensioned bolts, unattached bases.

Text Books

1. Ramachandra, *Design of steel structures, Vol. I & II,* Rajsons Publications Pvt. Ltd.
2. Punmia B C, Ashok Kumar Jain & Arun Kumar Jain, *Comprehensive Design of steel Structures,* Laxmi publication.
3. Duggal S K*., Design of steel structures,* Tata McGraw Hill publications

Reference Book

1. Shiyeker M R, *Limit state design in Structural Steel,* PHI Learning Pvt. Ltd.
2. Dayaratnam P., *Design of Steel Structure,* S Chand Publishers
3. Raghupathi M., *Design of steel Structure*, Tata McGraw Hill
4. Teaching Resource for Structural Steel Design, INSDAG Kolkata

Semester V
SOIL MECHANICS & ENGINEERING GEOLOGY

Course Code: ECE 502	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To make the students aware about the Soil mechanics & Engineering Geology which is a fast developing branch of Civil Engineering. Its study is essential for fast execution & maintenance of several civil Engineering works.

Unit I **(Lectures 08)**

General Geology: Geology – Importance and Scope in Civil Engineering; Earth processes - Weathering, Work of rivers and wind and their engineering importance, Earthquake, Landslides.
Earthquake –terminology, causes & classification, magnitude & intensity, Earthquake belts in India; Earthquake resistant structures.
Landslides – causes and classification, preventive measures.

Unit II **(Lectures 08)**

Soil Mechanics: Introduction, Soil - physical properties, Index properties, Engineering properties; Soil formation; Soil profile; Classification of soil - Particle size, Unified & IS; Soils groups of India.
Index properties & their determination – water content, specific gravity, sieve analysis, consistency of soil, Atterberg's limits - liquid limit & plastic limit.
Brief description about engineering properties of soil - void ratio & porosity, permeability, soil compressibility & bearing capacity.

Unit III **(Lectures 08)**

Mineralogy & Petrology: Minerals - physical & chemical properties of some common minerals viz., quartz, feldspar, muscovite, biotite, talc, gypsum, calcite, fluorite, apatite, corundum, topaz, bauxite, hematite, pyrite, chalcopyrite, pyrolusite, galena & graphite.
Rocks: Definition; Origin; Structure; Texture and classification of Igneous, sedimentary & metamorphic rocks; Suitability of these rocks as engineering materials.

Unit IV **(Lectures 08)**

Engineering properties of rocks: Introduction, Rocks as material for construction; Properties of building stones & road materials; Rocks as sites for construction; Laboratory testing of rocks - compressive strength, tensile and shear strength; Improvement of sites – grouting, backfilling & reinforcement, rock bolting.
Geological considerations necessary for construction of Dams, reservoirs, tunnels and highways.

Unit V **(Lectures 08)**

Structural Geology and Geophysical Methods: Dip & Strike; Outcrops; Inlier & outliers; Study of structures – Folds, faults and joints- terminology, classification & their bearing on engineering construction; Recognition of faults in the field.
Groundwater – Mode of occurrence; Water bearing qualities of rocks – aquifer, aquifuges, & aquitard; Types of aquifer & their functions.
Ground water exploration; Geophysical investigations - Resistivity & seismic methods; Ground water potential of India; Engineering considerations for groundwater.

Text Books:

1. Parbin Singh, *"Engineering and General Geology"*, K Kataria & Sons, New Delhi, 2010
2. Krynine and Judd, *"Engineering Geology and Geotechniques"*, McGraw Hill Book Company, 1990
3. P.C Varghese, *Engineering Geology for Civil Engineers,* PHI Learning Pvt. Ltd, 2012
4. N C Kesavulu, *Text book of Engineering Geology,* Macmillan Delhi 2009

5. K V G K Gokhle, *Principles of Engineering Geology,* B S Pub. 2010
6. Ranjan, G. and Rao *"Basic Soil Mechanics"*, , ASR,
7. Mittal.S. and Shukla , J.P., *"Soil Testing for Engineers"*, Khanna Publishers, New. Delhi

References books:

1. Legeet, *"Geology and Engineering"*, McGraw Hill Book Company 1998
2. Blyth, *"Geology for Engineers"*, ELBS, 1995
3. Mittal, S, *"Pile foundation design & Construction"*, CBS Publishers & distributors, New Delhi

Semester V
TRANSPORTATION ENGINEERING

Course Code: ECE 503

L	T	P	C
3	0	0	3

Objective: To provide knowledge of Transportation Engineering, which includes highways, railways, airports, docks & harbor etc.

Unit I **(Lectures 08)**

Introduction: History of road development; Modes and development of traffic systems - their features and requirements.

Unit II **(Lectures 08)**

Highways: Highways - Classification of highways; Highway geometric designs and their standards - alignment of highways, width elements, camber, gradient, super elevation, Sight distance; Highway materials and their requirements; Flexible and rigid pavements; Water bound macadam roads; Black top roads; Concrete roads, Ideal road, Express ways .

Unit III **(Lectures 08)**

Railways: Development of Indian Railways; Functions, requirements and components of permanent way. Stations and Yards – Selection, requirements of site and classification; Working principle of simple turnout; Signals and their classifications; Modern development in railways.

Unit IV **(Lectures 08)**

Airports: Selection of site; Elements and typical layout - orientation and length; Patterns of runways - identification of runways (runway numbering); Parking of aircrafts; Navigational aids.

Unit V **(Lectures 08)**

Docks and Harbors: Seaport- Selection of site, elements and typical layout; Docks and harbors- Functions, requirements and classifications; Break water and their types dredging.

Text Books:

1. Khanna S K and Justo C E G, *"Highway Engineering"*, Nem Chand and Bros, Roorkee, 2001
2. Bindra S P,*"A course in Highway Engineering"*, Dhanpat Rai Publications, New Delhi 1999
3. Arora S and Saxena S C, *"A text book of Railway Engineering"*, Dhanpat Rai & Sons, Delhi,1996
4. Rangwala S C and Rangwala P S, *"Airport Engineering"*, Charotar Publishing House, Anand,
5. Srinivasan R and Rangwala S C, *"Harbour, Dock and Tunnel Engineering "*, Charotar Publishing House, Anand, 2001

References Books:

1. *IRC Standards (IRC 37 - 2001 & IRC 58 -1998)*
2. *Bureau of Indian Standards (BIS) Publications on Highway Materials*
3. *Specifications for Road and Bridges, MOST (India)*
4. Rangwala S C and Rangwala P S, *"Airport Engineering"*, Charotar Publishing House, Anand, 2003
5. Srinivasan R and Rangwala S C, *"Harbour, Dock and Tunnel Engineering"*, Charotar Publishing House, Anand, 2001

Semester V

IRRIGATION ENGINEERING & HYDRAULICS

Course Code: ECE 504

L	T	P	C
3	0	0	3

Objective: To make the students aware about the Hydraulic Engineering - Land and Water Development and sustainability of irrigation and drainage infrastructure.

Unit I **(Lectures 08)**

Measurement of rainfall; Evapo-transpiration; Catchment area; Khosla theory, Keneddy theory, Lacey's formulae, Manning's equation, L-section of canals.

Regulation works Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, and design of straight Glacis fall. Off-take alignment, cross-regulator and distributory, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes, fish ladders.

Unit II **(Lectures 08)**

Cross drainage works: Classification and their selection, hydraulic design aspects of aqueducts, siphon aqueducts, super passage, canal syphon and level crossing, design of transitions.

Diversion canal headworks: Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

Unit III **(Lectures 08)**

Storage Headworks: Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams constant angle and constant radius arch dam, simple design and sketchs, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

Unit IV **(Lectures 08)**

Spillways and Energy Dissipaters: Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.

Unit V **(Lectures 08)**

Hydraulic Pumps: Rotodynamic pumps, basic equations, axial and mixed flow pumps, cavitation in pumps, characteristics curves. Hydraulic Turbines: Introduction, Rotodynamic Machines, Including elementary concept of bulb and tubular turbines pelton Turbine, equations for jet and rotor size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, basic equation for type, Head on reaction turbine, basic equation for rotodynamic machines, similarity law and specific speed, cavitation characteristic curves.

Text Books:

1. P.N.Modi. *"Irrigation, Water Resources and Water Power Engineering",*
2. Bharat Singh., *"Fundamentals on Irrigation Engineering",*
3. S.K.Garg. *"Irrigation Engineering and Hydraulic Structures",*

Reference Books:

1. R.S.Varshney, *"Theory and Design of Irrigation Structures Vol.I & II"*, Gupta & Gupta.
2. French, R.H., *"Open Channel Hydraulics"*, McGraw Hill International
3. Graf, W.H., *"Hydraulics of Sediment Transport"*, McGraw Hill International

Semester V
STRUCTURAL ANALYSIS II

Course code: ECE 505	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: The objective of the course is to provide students with a basic understanding of structural analysis in the design and analysis of structures.

Unit I **(Lectures 08)**

Arches: Introduction to Arches; Types of arches; Analysis of Arches - three hinged, two hinged, fixed, parabolic and circular arches; Settlement and temperature effects.

Unit II **(Lectures 08)**

Influence line diagrams: Muller-Breslau's Principle and its applications for drawing influence lines for Indeterminate beams; Influence line diagrams for maximum bending moment, Shear force and thrust for three hinged and two hinged arches.

Unit III **(Lectures 08)**

Bridges and Cables: Suspension Bridges; Analysis of cables with concentrated and continuous loadings; Basics of two and three hinged stiffening girders - Influence line diagrams for maximum bending moment and shear force for stiffening girders.

Unit IV **(Lectures 08)**

Force and Displacement methods: Basics of Force and Displacement Matrix methods; Analysis of beams and trusses.

Unit V **(Lectures 08)**

Kanis Method: Introduction and application to fixed beams, and continuous beams; Analysis of frame with & without lateral sway.

Text Books:

1. S S Bhavikatti , *Structural Analysis-II,* Vikas Publishing house Pct Ltd.
2. S,P Gupta & G S Pandit, *Structural Analysis* Tata Mc Graw Hill Publishing Company Limited, New Delhi.

Reference Books:

1. S Ramamruthan & R Narayan, *"Theory of Structures,* - Dhanpat Rai & Sons.
2. P. Timoshenko and D. Young, *"Theory of Structures"*, Mc-Graw Hill Book Publishing Company Ltd., New Delhi.

Semester-V
TECHNICAL WRITING

Course code: EHM 501

L	T	P	C
2	0	2	3

Course Contents:

Unit I
Forms of Technical Communication: Report writing, Definition and characteristics, Steps towards report writing, Structure, style of Report writing, Types & forms of Reports, Presentation of Reports, Importance of Report writing.

Unit II
Technical Paper writing: Definition and purpose, Essentials of a good technical paper/Article, Scientific Article writing, Difference between Technical paper/Article and scientific article, Methods of writing technical paper & Scientific article.

Unit III
Technical Proposal: Definition and meaning of Technical Proposal, Significance of Proposal, Characteristics of a good Proposal, Format of Proposal, Uses of Proposals.

Unit IV
Writing Skills: Reporting events, Writing newspaper reports, Essentials of essay writing –writing an essay of about 300 words on a given topic. Bio-Data Making, Writing of CV & Resumes, Difference between CV and Resume, Writing Job application etc.

Unit V
Value-based Text Reading: R.K.Narayan-A Bookish Topic

1. Francis Bacon- of studies
2. CEM Joad- The Civilization of Today.

(Note: The two periods per week may be utilized in Language Lab covering the above syllabus.)

Text Books:

1. Singh R.P., *An Anthology of English Easy* O.U.P. New Delhi.
2. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practice* – O.U.P. New Delhi. 2007.

Reference Books:

1. Monippally Matthukutty M., *Business Communication Strategies* – Tata- Mc Graw Hill Publications Company, New Delhi.
2. Mohan K. & Sharma R.C., *Business Correspondence of Report Writing* –TMH, New Delhi.

NOTE:
This syllabus has been designed to improve the oral and written communication skills of students. The faculty members should put emphasis on practical (oral) activities for generating students' interest in language learning.

***Latest editions of all the suggested books are recommended.**

Semester V

STRUCTURAL ANALYSIS (LAB)

Course Code: ECE 551	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine the flexural rigidity (EI) of a given beam.
2. To verify Maxwell's reciprocal theorem.
3. To find carry over factor for the beam with far end fixed.
4. To verify the Clark-Maxwell reciprocal theorem with simply supported beam
5. To determine the deflection of curved members
6. To study the buckling of columns
7. To find critical load in struts with different end conditions.
8. To draw ILD for deflection in a steel beam using unit load method
9. To draw ILD for support reaction using Muller-Breslau Principle
10. To find forces in elastically coupled beams
11. Plate 1 Detailing of built-up beams including curtailment of flange plates.
12. Plate 2 Detailing of column including lacings and patterns.
13. Plate 3 Detailing of column bases- slab base and gusseted base.

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

<table>
<tr><td colspan="3">PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (25 MARKS)</td><td rowspan="2">ATTENDANCE (10 MARKS)</td><td rowspan="2">Experiment (5 MARKS)</td><td rowspan="2">VIVA (10 MARKS)</td><td rowspan="2">TOTAL INTERNAL (50 MARKS)</td></tr>
<tr><td>EXPERIMENT (10 MARKS)</td><td>FILE WORK (05 MARKS)</td><td>VIVA (10 MARKS)</td></tr>
</table>

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester V
SOIL MECHANICS & ENGINEERING GEOLOGY (LAB)

Course Code: ECE 552

L	T	P	C
0	0	3	1.5

Objective: To make the students aware about various methods of testing the important properties of soil and rocks, on which the foundation of building would be laid.

LIST OF EXPERIMENTS

Soil Mechanics

1. To determine the particle size distribution in a soil sample (Sieve Analysis).
2. To determine the moisture content of soil by pycnometer method.
3. To determine the specific gravity of soil sample by pycnometer method.
4. To determine the liquid limit of a given soil sample.
5. To determine the plastic limit of a given soil sample.
6. To determine the Shrinkage limit of a given soil sample.

Engineering Geology

1. To identify minerals based on their physical properties.
2. To identify rocks based on their physical properties.
3. To draw contour patterns of hills, valleys, rivers, plateau, saddle, topographic basin etc.
4. To draw topographical map from the given contour map.
5. To determine the strike & dip of rock formation using geological map.
6. To draw geological section from the given map.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester V
TRANSPORTATION ENGINEERING LAB

Course Code: ECE 553	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

LIST OF EXPERIMENTS

1. To determine crushing value of aggregates (Crushing Value Test).
2. To determine impact value of the road aggregates (Impact Test).
3. To determine the Los-Angeles' abrasion value of aggregates (Abrasion Test).
4. To determine the (i) elongation index & (ii) flakiness index of given aggregates.
5. To determine consistency of bitumen (Penetration Test).
6. To determine the softening point of bituminous sample (Softening Point Test).
7. To determine stripping time of bituminous sample.
8. To determine the ductility of a given sample of bituminous.
9. To determine flash & fire point of a given bituminous sample.
10. To determine the California Bearing Ratio (CBR) value of the soil.

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VI
FOUNDATION ENGINEERING & RETAINING STRUCTURES

Course code: ECE 601	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: The objective of the course is to provide students with a basic understanding of geotechnical principles in the design and analysis of shallow foundations, deep foundations and retaining structures.

Unit I **(Lectures 08)**

Shallow Foundation: Methods of estimation of bearing capacity; Computation of bearing capacity factor; Effect of eccentric and inclined loads; Effect of water table on bearing capacity; Moyerhof's analysis; Bearing capacity of stratified soils; Methods of estimation of settlement of footings; Proportioning of footings .

Unit II **(Lectures 08)**

Limits of settlements for various structures - Indian Standard Code Provisions (IS: 1904, 6403, 8009); Determination of allowable bearing capacity as per IS code; Schemartman's method, Dee beer and Mortin methods of finding out settlement from static cone penetration test; Methods of finding out bearing capacity from plate load test, standard penetration test data.

Unit III **(Lectures 08)**

Pile Foundations: Types of pile and their uses; Modes of failure; Bearing capacity and settlement of pile foundation; Allowable load; Dynamic and static formulae; Pile group bearing capacity and settlement; Pile load test; Negative skin friction; Behavior of piles under lateral loading - Winkler's assumption, Pile resistance and deflection under lateral loads, elastic method, Brooms method.

Unit IV **(Lectures 08)**

Foundation on Difficult Soils: Collapsible soils - Identification, Collapse settlement, foundation design; Sanitary landfills settlement of sanitary land fill.
Expansive soils - Behaviour of expansive soil, foundation practices; Under-reamed piles; Methods of finding out load carrying capacity of under-reamed piles in clayey and sandy soils; Provisions of IS 2911 Part III-1980 for design of under-reamed pile Foundation.

Unit V **(Lectures 08)**

Raft foundation: Common types of raft; Bearing capacity of raft; Differential settlement of raft; Semi empirical method of design of raft foundation.
Well foundation: Components, Design and Construction of Well foundation; Bearing capacity; Settlement and lateral resistance; Tilts and shifts, IS and IRC codes methods.

Text Books:

1. V.N.S. Murthy, *"Soil Mechanics and Foundation Engineering"*,
2. K.R. Arora, *"Soil Mechanics and Foundation Engineering"*,
3. Mittal, S., *"Pile Foundations Design and Construction"*, CBS Publishers New Delhi.

Reference Books:

1. J.E. Bowles Gopal Ranjan and A.S.R. Rao. *"Foundation Analysis and Design"*, *"Basic and Applied Soil Mechanics",*
2. C. Venkataramaiah *"Geotechnical Engineering"*,
3. M.J. Tomlinson. *"Foundation Design"*, Purshotham Raj "Ground Improvement Techniques",
4. Mittal, S & Shukla,JP. *"Soil Testing for engineers"*, Khanna Publishers, New Delhi
5. Swami Saran *"Design of Sub Structures"*,
6. Terzaghi,K. *"Basic Soil Mechanics"*,

Semester VI
STEEL STRUCTURES- II

Course code: ECE 602	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: To develop skill among the students to understand the basics of steel structure in detail.

UNIT-I **(Lecture 08)**

Plate Girder: Components of plate girder; Self weight and economical depth; Impact factor; Design of welded plate girder – Design considerations, IS-code recommendations, stiffeners, reduction of flange plates, Connections.

UNIT-II **(Lecture 08)**

Beam column connections: Design of beam to column connections - small moment resistant connection (Clip angle connections), large moment resistant connection (Split beam connections).

UNIT-III **(Lecture 08)**

Design of Roof Trusses: Different types, components, economical spacing, load assessment for DL, LL & WL; Load combination; IS Code recommendations; Design of purlins.

UNIT IV **(Lecture 08)**

Industrial Buildings: Major components of an industrial building; Planning and structural framing; Bracings of industrial building, industrial bents in traverse & longitudinal directions.

UNIT V **(Lecture 08)**

Plastic analysis and design of steel structures: Introduction; Applicability of simple plastic theory of bending - Plastic bending of beams, Fully plastic moment of a section, Plastic hinge, Shape factor, Load factor, Margin of safety; Mechanism of hinge formation - static theorem or lower bound theorem, kinematic theorem or upper bound theorem, uniqueness theorem of combined theorem; Plastic collapse of a structure; Collapse load for standard cases of beams.

Text Books

1. Ramachandra, *Design of steel structures,* Vol. I & II, Rajsons Publications Pvt. Ltd.
2. Punmia B C, Ashok Kumar Jain & Arun Kumar Jain, *Comprehensive Design of steelStructures,* Laxmi publication.
3. Duggal S K., *Design of steel structures,* Tata McGraw Hill publications

Reference Book

1. Shiyeker M R, *Limit state design in Structural Steel*, PHI Learning Pvt. Ltd.
2. Dayaratnam P., *Design of Steel Structure*, S Chand Publishers
3. Raghupathi M., *Design of steel Structure*, Tata McGraw Hill
4. Teaching Resource for Structural Steel Design, INSDAG Kolkata

Semester VI
PUBLIC HEALTH & ENVIRONMENTAL ENGINEERING

Course code: ECE 603	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To develop skills among the students to identify the principal factors imposing impacts on man and other environmental species and to assess the significance of emerging issues in an objective manner.

Unit I **(Lectures 08)**

Water Supply Systems (Source & Conveyance): Objectives; Population forecasting- Design period, Water demand characteristics, Mess curves; Sources of water – Source selection, Water quality parameters, significance and standards, Intake structures, Conveyance, Hydraulics, laying, jointing & testing of pipes, Pipe corrosion, appurtenances, Pumps, selection of pump.

Unit II **(Lectures 08)**

Design Principles of Water Treatment: Objectives; Selection of unit operations and processes – Principles of flocculation, sedimentation, filtration, disinfection; Design principles of flash mixer, flocculator, clarifiers, filters, Disinfection devices, Softening, Demineralization, Aeration, Iron removal, De-fluoridation; Operation and Maintenance aspects – Residue Management; Distribution network, Requirements, Components, Analysis by Hardy Cross method, Equivalent Pipe method, computer application, Leak detection, Service reservoir design.

Unit III **(Lectures 08)**

Sewerage System (Collection & Transmission): Sources of wastewater – Quantity of sanitary sewage, Storm runoff estimation; Wastewater characteristics and significance; Effluent disposal standards, Design of sewers, Computer applications, Laying, jointing and testing of sewers, Sewer appurtenances, Pumping.

Unit IV **(Lectures 08)**

Sewage Treatment & Design Principles: Objectives; Selection of unit operation and process; Design principles of primary and secondary treatment units – screen chamber, grit chamber, primary sedimentation tank, activated sludge process, Aeration tank and oxidation ditch, Trickling filter, Stabilization ponds, Septic tanks with soak pits; Sludge treatment and disposal; Biogas recovery.

Unit V **(Lectures 08)**

Disposal of Sewage: Disposal on land - sewage farming; Disposal into water bodies – oxygen sag curve, Streeter Phelp's model; Wastewater reclamation techniques.

Text Books:

1. Garg, S.K., *"Environmental Engineering Vol. I & II"*, Khanna Publishers, New Delhi, 1994.
2. Modi, P.N., *"Environmental Engineering Vol. I & II"*, Standard Book House, New Delhi
3. Punmia B.C., *"Environmental Engineering Vol. I & II"*, Lakshmi Publications (P) Ltd., New Delhi, 2002.

References Books:

1. *"Manual on Water supply and Treatment"*, CPHEEO, Government of India, New Delhi, 1999
2. *"Manual on Sewerage and Sewage Treatment"*, CPHEEO, Government of India, New Delhi, *"Hand book on Water Supply and Drainage"*, SP35, B.I.S., New Delhi, 1987
3. Metcalf & Eddy, M.C., *"Wastewater Engineering – Treatment & Reuse"*, Tata McGraw Hill Publications, New Delhi, 2003

Semester VI
RCC STRUCTURE II

Course code: ECE 604	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

Objective: To understand the nature of stresses and carry out design and analysis of RCC structures.

Unit I **(Lectures 08)**
Design of flat slabs: Nature of Stresses in flat slabs with and without drops; Coefficient for design of flat slabs; Reinforcement in flat slabs (IS Code Method).

Unit II **(Lectures 08)**
Design of curved beams and footings: Analysis and design of beams curved in plan; Structural behavior of footings; Design of footings - Wall and a single column, combined rectangular, trapezoidal and Strap footings.

Unit III **(Lectures 08)**
Design of Retaining walls and culverts: Concept of counter fort retaining wall; Structural behavior of retaining wall; Stability of retaining wall against overturning and sliding; Design of T-shaped retaining wall; Design of RCC slab culvert - Loads, forces; I.R.C. (Indian Road Congress) bridge loadings.

Unit IV **(Lectures 08)**
Design of overhead and underground Tanks: Tanks -Design criteria, material specifications and permissible stresses; Design of circular/rectangular tank situated on the ground / underground and overhead (INTZ Tank).

Unit V **(Lectures 08)**
Prestressed Concrete: Introduction; Advantages and methods; Losses in prestress; Analysis of simple prestressed rectangular and T-section.

Text Books:
1. A. K. Jain, *"Reinforced Concrete – Limit State Design"*, Nem Chand & Bros., Roorkee.
2. *IS: 456 – 2000*.

Reference Books:
1. O. P. Jain & Jai Krishna, *"Plain and Reinforced Concrete Vol. I & II"*, Nem Chand & Bros.
2. R. Park and Pauley., *"Reinforced Concrete Structures"*,
3. P. Dayaratnam., *"Reinforced Concrete Design"*,

Semester VI
ESTIMATION & COSTING

Course Code: ECE 605	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To make the Engineering students aware about the estimating and costing in Civil Engineering.

Unit I **(Lectures 08)**

Introduction: Types of estimates - Units of measurements; Methods of estimates – Advantages of estimates of Buildings; Load bearing and framed structures - Calculations of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and paintings / varnishing for shops, rooms, residential building with flat and pitched roof; Various types of arches - calculations of brick work and RCC works in arches; Estimate of joineries - paneled and glazed doors, windows, ventilators, handrails etc.

Unit II **(Lectures 08)**

Estimates of other Structures: Estimates - Septic tank, Soak pit, Sanitary and water supply installations (water supply pipe line, sewer line), Wells (tube well, open well); Estimate of bituminous and cement concrete roads; Estimate of retaining walls, culverts; Estimating of irrigation works - aqueduct, siphon, fall.

Unit III **(Lectures 08)**

Specifications and Tenders: Schedule of rates; Analysis of rates; Specifications – Sources, Detailed and general specifications; Tenders ; Contracts - Types of contracts ; Arbitration and legal requirements.

Unit IV **(Lectures 08)**

Valuation: Necessity - Basics of value engineering; Capitalised value; Depreciation; Escalation value of Building; Calculations of Standard rent - Mortgage, Lease .

Unit V **(Lectures 08)**

Report Preparation: Principles for report preparation - report on estimate of residential building, Culvert, Roads; Water supply and sanitary installations - Tube wells, Open wells.

Text Books:

1. Dutta B N., *"Estimating and Costing in Civil Engineering"*, UBS Publishers & Distributors Pvt. Ltd., 2003.
2. Kohli D D and KOhli R C., *"A Text Book of Estimating and Costing (Civil)"*, S.Chand & Company Ltd., 2004

Reference Books:

1. *A. Aggarwal & A K Upadhyay, "Civil Estimating, Costing & Evaluation", S K Kataria & Sons*

Semester VI

FOUNDATION ENGINEERING & RETAINING STRUCTURES (LAB)

Course code: ECE 651

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

1. To determine the moisture content of soil using Hydrometer.
2. To determine the optimum moisture content (OMC) of soil by Standard Proctor Test (Compaction Test).
3. To determine the permeability of the soil by constant head test (Lab Permeability Test).
4. To determine the permeability of the soil by falling head test (Lab Permeability Test).
5. To determine the density of soil in the field (In situ Density - Sand Replacement).
6. To determine the penetration value of the soil (Dynamic core Penetration Test).
7. To determine the shear strength of soil by applying normal force to bring the sample failure (Direct Shear Test).
8. To determine the shear strength of soft clay in the field (Vane Shear Test).
9. To determine the compressive strength of the soil (Unconfined Compression Test).
10. To determine the shear strength of soil in the laboratory (Triaxial Shear Test).

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

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External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VI
PUBLIC HEALTH ENGINEERING LAB

Course code: ECE 653

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

1. To determine the turbidity, colour and conductivity of water sample.
2. To determine the pH, alkalinity and acidity of water sample.
3. To determine the hardness and chlorides of water sample.
4. To determine the residual chlorine and chlorine demand of water sample.
5. To determine the dissolved oxygen of water sample.
6. To determine the BOD of water sample.
7. To determine the COD of water sample.
8. To determine the most probable number of coli-forms.
9. To measure air pollutants with high volume sampler.
10. To measure sound levels with sound level meter.

Evaluation of Practical Examination:

Evaluation of Practical Examination:
Internal Evaluation (50 marks)
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External Evaluation (50 marks)
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EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VI
ESTIMATION & COSTING (LAB)

Course code: ECE 655

L	T	P	C
0	0	3	1.5

LIST OF EXPERIMENTS

1. Symbols used in Civil Engineering Drawing, Masonry Bonds.
2. Comprehensive Drawing of Residential Building (Layout plan, elevation & sectional elevation)
3. Plan, elevation & sectional drawing of door, window & staircases &their labeling
4. Comprehensive drawing of planning & electrical fitting drawing of residential & Multistoried buildings
5. Preparation of estimates of residential (Multistoried building, Plumbing & Electrical fittings.
6. Preparation of layout plan of soakpits septic tank & their estimate
7. Preparing the layout plan of water & sewer line services and their estimation

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

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External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VI

Estimation & Costing (Lab)

[ECE 656 amended vide approval dt. Jan 11, 2017 of V.C]

Course code: ECE 656 **L T PC**
0 0 3 1.5

Objective: The main objective is providing student the skill of estimating the approximate cost of a construction project from Autodesk Quantity Takeoff drawing.

LIST OF EXPERIMENTS

1. Comprehensive drawing of planning including plumbing& electrical fitting drawing of residential & Multistoried Buildings
2. Introduction to Autodesk Quantity Take off software (It will be covered in six sessions*)
3. Preparation of estimates of residential & multistoried building, Plumbing & Electrical fittings.
4. Preparing the layout plan of water & sewer line services and their estimation using software
5. **Project**: To calculate the total quantity of various material components for a residential and multistoried building.
   i.e. – cement, sand, aggregates, brick etc complete including estimating cost of the building using **AUTODESK QUANTITY TAKE OFF**
   The student will submit the complete report of the building on the completion of the project. Minimum floor area 1000 Sqm. & minimum 6 floors are required.

• Introduction
  ○ Estimation
  ○ Quantity Takeoff
  ○ Autodesk Quantity Takeoff
  ○ DWF, Non-intelligent image formats
  ○ DWF creation
  ▪ AutoCAD
  ▪ Revit Architecture
• Takeoff tools
  ○ Manual Takeoff Tools
  ○ Automatic Takeoff Tools

• Workflow
• Graphical User Interface
• Adding Additional Currencies
• Catalog
  ○ Create a New Catalog
  ○ Export and Import
• Preferences
• Settings
• Organizing the Projects
• Work Breakdown Structure
• Sheet Scale

• Manual Takeoff Tools
  ○ Area Takeoff Tools
  ○ Backout
• Assembly

• Manual Takeoff Tools
  ○ Linear Takeoff Tools
  ○ Count Takeoff Tools

• Automatic Takeoff Tools o Model Takeoff o Search Takeoff o Single Click Auto Takeoff
• Report Generation

Learning Outcomes:

Students will learn compressive planning drawing& estimating of residential multistoried building using software.

Reference Guide:

1. "Building Estimation &Costing" "By using Auto Desk Quantity Takeoff" "CADD CENTRE"

Evaluation of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 5point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (25MARKS)			ATTENDANCE (10 MARKS)	Project (10 MARKS)	VIVA (5 MARKS)	TOTAL INTERNAL (50MARKS)
EXPERIMENT (10 MARKS)	FILE WORK (05MARKS)	VIVA (10MARKS)				

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	PROJECT WORK (20 MARKS)	VIVA (10 MARKS) TOTAL	EXTERNAL (50 MARKS)

Semester VI
SURVEY CAMP

Course Code: ECE 691

L	T	P	C
0	0	0	3

The students would be required to undertake a survey camp which will preferably be in a hilly area.

The camp will be for six to ten days after the fourth semester examination. Students would be divided equally amongst the faculty of the Civil Engineering department who would oversee the daily activity and the camp progress. Each team will consist of 3-4 students and the following activities shall be carried out during the camp. Students will be expected to use the latest equipments and methodology to complete the camp activities.

1. Reconnaissance survey and selection of control points
2. Establishment of control points and reconnaissance map preparation
3. Theodolite observations of traverse/triangulation station
4. Measurement of base lines of traverse/triangulation station
5. Leveling and Bearing observations of traverse/triangulation station
6. Adjustment of errors in observations and Computation of Coordinates
7. Preparing grid on plane table sheet and draw the diagonal scale and Plot the control stations with the help of coordinates
8. Field checking of control points and plotting the details using Radiation Method as well taking the elevations
9. Use of Radiation and Intersection methods to plot the details on Plane Table as well as taking the elevations
10. Plotting the contours simultaneously with Plane Table work
11. Formatting, Inking and Colouring the Plane Table Map

Each group will complete the above and submit the report of the camp in the format along with the level book, calculation sheets and final results.

The camp performance will be evaluated as in case of practical evaluation.

Semester VII
HARBOUR, DOCK & AIRPORT ENGINEERING

Course Code: ECE701	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To provide knowledge of essentials of Harbor, dock & Airport Engineering.

Unit I **(Lecture 08)**

Introduction: Water transportation - History and development, Types, Advantages and disadvantages; Selection of site; Essential features of a good harbour - Size, Depth, Turning basin, Harbour entrances.

Unit II **(Lecture 08)**

Natural phenomena in harbour engineering: Tides; Winds and waves; Littoral drift.
Harbour Works: Breakwaters – Types and their construction, Wharves, Piers, Jetties, Quays; Berthing Structures – Dolphins, Trestles, Moles, Moorings accessories, Apron; Transit sheds and Warehouses; Dredging – Types and operations, choice of dredgers; Navigational aids – Necessity, types and requirements.

Unit III **(Lecture 08)**

Ports and Harbours: Differences between port & harbor; Classification and requirements; Maintenance.
Docks: Advantages; Shape of docks and basins; Types of Docks – Wet docks; Dry Docks - Lift, Graving, Floating and Marine Railway Docks; Locks and Lock Gates.

Unit IV **(Lecture 08)**

Airways: History & development of air transport; Advantages & disadvantages.
Airport Planning: Regional planning; Selection of site; Classification.
Runway: Orientation – Windows diagram; Basic runway length - Corrections for elevation, Temperature and gradient; Geometric design - cruising speed, airspeed beaufort scale; Different types of runways; Airport capacity.

Unit V **(Lecture 08)**

Airport Obstructions: Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone.
Terminals: Terminal area; Typical Airport layouts; Aircraft parking system; Apron; Hanger.
Air Traffic Control & Visual Aids: Airport marking and landings; Landing systems; Landing aids; Instrument landing system.

Text Books

1. Vaswani N. K.: *Airport Engineering*
2. Khanna S. K. & Arora M. G.: *Airport Planning & Design*

References Books

1. Srinivasan R., *Harbour, Dock & Tunnel Engineering*
2. Bindra S. P., A *Course in Docks & Harbour Engineering*
3. Oza H. P., *Dock and Harbour Engineering*

Semester VII
HIGHWAY ENGINEERING

Course code: ECE 702	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To impart the knowledge to the students in highway engineering, which includes highway development and planning, designing and general consideration.

Unit I **(Lecture 08)**

Highway Development & Planning: History and development - Nagpur plan; Jaykar Committee recommendations; Bombay plan; Road Plan –2020; Characteristics of road transport; Road Classification; Road patterns; Road layouts.

Unit II **(Lecture 08)**

Traffic Engineering: Traffic characteristics; Accidents and their preventive measures, Traffic studies; Traffic control devices; Types and design of traffic signal systems – Approximate method, Trial cycle method, Webster's method; Traffic Islands - Divisional islands, Channelizing islands; Rotaries; Design of intersections; Design of parking facility; Highway lighting.

Unit III **(Lecture 08)**

Highway design: Alignment- Fundamental principles and factors controlling the Selection; Highway survey; Width of formation; Right of way; Width of pavement; Camber; Gradient; Super elevation; Extra widening on curves; Design speed; Sight distances; Road Cross-section- Provision of Shoulders, Cycle tracks, Footpaths and Drains; Arboriculture.

Unit IV **(Lecture 08)**

Geometric Design of Highways: Simple curves – scope, Degree of curve, characteristics, offset from chord produced; Rankine's method; obstacles in curve setting Compound and Reverse Curves; Transition Curve- types, Length, Characteristics, equations, shift; tangent length and curved length of combined curve; setting out of combined curve
Vertical curve – scope, assumption of vertical curve, equations, setting out vertical curve Summit and Valley curves

Unit V **(Lecture 08)**

Tests on Road Materials and Proportioning of Mixes: Tests on aggregates, gravel, sand, moorum, bitumen, cement, concrete; concrete mix design; CBR test of soil; relevant IS and IRC Codes of Practice.
Road Construction and Maintenance: Highway Construction: Construction of cement concrete pavements, W B M roads; Soil stabilised roads; Drainage.
Culverts: Earth Cushion and wing walls; Bitumen Roads – Surface dressing; BM, SDBC; Grouting and premix; Quality control; Highway maintenance

Reference Books:

1. Khanna S. K. and Justo C. E. G.: *Highway Engineering*
2. Vaswani N. K.: *Highway Engineering*
3. Bindra S. P.: *A Course in Highway Engineering*

Semester VII
MANAGERIAL ECONOMICS

Course code: EHM 701	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Unit – I **(Lecture 08)**

Managerial Economics: Definition; Nature and scope of Managerial Economics; Managerial Economics and Micro-economics; Managerial Economics and Macro-economics; Applications of Economics in Managerial decisions making.

Unit – II **(Lecture 10)**

Demand: Demand Analysis; Determinants of Market Demand; Law of Demand; Elasticity of Demand – Measurement and its use; Demand Forecasting – Techniques of Demand Forecasting.

Production and Costs: Meaning of Production Function; Law of variable proportions; Law of Supply and Elasticity of Supply; Costs and Cost Functions – Short Terms Costs and their use in decision making, Determinants of costs; Break Even Analysis; Cost Forecasting

Unit – III **(Lecture 10)**

Theory of Consumer Behavior: Cardinal Utility Theory – Assumptions, Law of diminishing marginal utility, Law of equimarginal utility, Consumer's equilibrium, Derivation of demand curve; Ordinal Utility Theory – Assumptions, Meaning and properties of indifference curve, Marginal rate of substitution, Consumer's equilibrium, Income consumption curve, Price consumption curve, Income & substitution effects of normal goods under Hicksian approach, Derivation of demand curve.

Unit – IV **(Lecture 08)**

Market Structure: Perfect Competition – Features of pure and perfect competition, Determination of price, Short and long run equilibrium of a firm, Shut down point and its significance;
Monopoly – Features, Causes, Short run equilibrium of a firm, Concept & conditions of price discrimination, Third degree price discrimination; Monopolistic Competition – Features, short and long run equilibrium of a firm.

Unit –V **(Lecture 08)**

National Income – Concepts and various methods of its measurement; Inflation – types and causes; Business Cycle; Profit concept; Major theories of profits – Dynamic Surplus theory, Risk & Uncertainty bearing theory and Innovation theory.

Text Books:

1. Dwivedi, D. N, *Managerial Economics,* Vikas Publishing House, New Delhi
2. Varshney & Maheshwari, *Managerial Economics ,* Sultan Chand & Sons, New Delhi
3. Dholakia & Oza, *Microeconomics for Management Students,* Oxford University Press, New Delhi

Reference Books:

1. Samuelson, N., *Economics,* Tata-McGraw Hill, New Delhi

Semester VII

INDUSTRIAL POLLUTION CONTROL AND ENVIRONMENTAL AUDIT

Course code: ECE703	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

UNIT-I **(Lecture 08)**

Industrial wastes & their sources; Various industrial processes; Sources and types of wastes - solid, liquid, gaseous, noise & radiation emissions; Sources for industrial water usages and various industrial processes requiring water use and water quality.

UNIT-II **(Lecture 08)**

Processes responsible for deterioration in water quality; Various waste water steams; Control and removal of specific pollutants in industrial wastewaters, e.g. oil and grease, bio-degradable organics, chemical such as cyanic, fluoride, toxic organics, heavy metals, radioactivity etc., Wastewater re-uses & recycling; Concept of zero discharge effluent.

UNIT-III **(Lecture 08)**

Control of gaseous emissions; Hood and ducts; Tail stacks; Particulate and gaseous pollutant control; Solid waste generation and disposal management; Hazardous wastes - Definition, concepts and management aspects; Noise & radiation - Generation, control and management.

UNIT-IV **(Lecture 08)**

Recent trends in industrial waste management; Cradle to grave concept; Life cycle analysis; Clean technologies; Case studies of various industries, e.g. Dairy, Fertilizer, Distillery, Sugar, Pulp and paper; Iron and steel; Metal plating; Thermal power plants, etc.

UNIT-V **(Lecture 08)**

Environment audit - Definitions and concepts; Environmental audit versus accounts audit; Compliance audit; Relevant methodologies; Various pollution regulations; Introduction to ISO and ISO 14000.

Text Books:

1. Metcalf & Eddy, *Wastewater Engineering: Treatment & Re-use*. Tata Mc Graw-Hill
2. Azad, Hardom Sing, *Industrial wastewater Management Handbook*, McGraw Hill, New York.

Reference Books

1. V. Hugher Jr, Gordan, George Wasner, Robert Williams and Marks, *Wastewater Reuse and Recycling Technololgy-Pollution Technology Review-72,* Culp,. Noyes Data Corporation, New Jersay.
2. B. Besselieve P.E *The treatment of Industrial wastes. Edmund*, McGraw Hill, New York.
3. Nancy, J. Sell *Industrial Pollution Control-Issues and Techniques*, Van Nostrand Reinhold Co. New York
4. Shen, T.T, *Industrial Pollution Prevention Handbook.* Springer-Verlag, Berlin.
5. Pandey G.N and Corney. G.C., *Environmental Engineering.*. Tata McGraw Hill, New Delhi

Semester VII
EARTHQUAKE RESISTANT STRUCTURES

Course code: ECE 704	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To make the students aware about Engineering seismology.

Unit I **(Lectures 08)**

Engineering Seismology; Elastic rebound theory, Theory of plate tectonics and movement. Seismic waves. Seismic intensity, Richter scale, Tsunami. Seismic zoning maps of India and comparison study. Response spectra. Strong motion characteristics.

Unit II **(Lectures 08)**

Earthquake effects on the structures, classification of loads, Seismic methods of analysis, seismic Design methods. Seismic damages during past earthquakes and effect of irregularities and building architecture on the performance of RC structures. Mathematical modeling of multistoried RC buildings with modeling of floor diaphragms and soil-foundation, Winkler model.

Unit III **(Lectures 08)**

Design of multi-story RC structure with foundation as per latest IS: 1893 by Equivalent static lateral load method and Response Spectrum Method. Introduction to Time history method, Capacity based design of soft story RC building, design of Shear Walls. Ductile detailing as per latest IS:13920.

Unit IV **(Lectures 08)**

Seismic design of multi-storeyed steel structures with various bracing systems, Lateral load analysis and design of two- storied masonry buildings, P-delta analysis.

Unit V **(Lectures 08)**

Seismic design of elevated RC Circular Water Tanks. Ductility requirements, types of ductility, factors affecting ductility, IS code provisions Seismic retrofitting, Sources of weakness in RC framed buildings, Classification of retrofitting techniques, Conventional and non-conventional methods, Comparative study of various methods and case studies, Introduction to Base Isolation systems. IS code provisions for retrofitting of masonry structures, failure modes of masonry structures and repairing techniques.

Text Books:

1. Jai Krishna, A.R. Chandrashekharan and B Chandra, *"Elements of Earthquake Engineering"*, South Asian Publishers Pvt. Ltd.
2. Joshi P S et al., *"Design of Reinforced Concrete Structures for Earthquake"*, Resistance Published by Indian Society of Structural Engineers, 2001

Reference Books:

1. P. Agarwal and M. Shrikhande, *"Earthquake Resistant Design of Structures"*, Prentice-Hall Publications.
2. *IS:1893 – Indian Standard Criteria for Earthquake Resistant Design of Structures*, Bureau of Indian Standards, New Delhi.
3. *IS:13935 – Repair and Seismic Strengthening of Buildings* – Guidelines, 1993
4. *IS:4326 – Earthquake Resistant Design and Construction of Buildings* – Code of Practice, 1993
5. *IS:13828 – Improving Earthquake Resistance of Low Strength Masonry Buildings*, 1993
6. *IS:13827 - Improving Earthquake Resistance of Earthen Buildings*, 1993
7. *IS:13920 – Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Force.*

Semester VII
IRRIGATION ENGINEERING & HYDROLOGY

Course code: ECE705	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To make the students aware about the Hydrology, irrigation and drainage infrastructure.

Unit I **(Lectures 08)**

Irrigation Principles and Practices: Introduction, Necessity, Advantages and disadvantages of irrigation, Classification, Methods of irrigation. Soil Water Crop and their Relationship: Soil classification, Indian soils, Soil water plant relationship, Soil moisture relationship, Frequency of irrigation.

Unit II **(Lectures 08)**

Water Requirement of Crops: Optimum use of water, Factors affecting water requirement of crops, Duty, Delta and Base period and their relationship. Determination of consumptive use, direct methods by using equations, Irrigation efficiency

Unit III **(Lectures 08)**

Flow Irrigation: Classification of canals, Canal alignment, Components of permanent canal system; Flow in Alluvial Channels, Design of channels for maximum permissible velocity, Kennedy's silt theory and design of channels on its basis. Lacey's silt theory and regime equations, various types of relations, Design of channels based on Lacey's equation.

Canal capacity, Canal losses, Lined channels & their design, Construction and maintenance of irrigation channels.

Lift Irrigation: Classification, Location, Water lifting arrangement, Yield of wells, Well troubles

Unit IV **(Lectures 08)**

Diversion Head Works Selection of site, Constituent parts of weir, Causes of failure of weir on permeable foundation, Bligh's creep theory, Khosla's theory.

Cross Drainage Works: Necessity, Type sand their selection, Foundation and cross sections, Important features of design of cross drainage works, River training works

Unit V **(Lectures 08)**

Hydrology: Hydrological cycle, Precipitation, Measurement analysis, Average depth of rainfall, Factors affecting run off, Run off measurements, Mass curves, Flood frequency studies Hydrograph, Unit hydrograph, Infiltration, Estimation of run off by infiltration method, Principles of Flood Routing

Text Books:

1. Modi P N: *Irrigation Water Resources & Water Power Engineering*, Standard Book House
2. Sahasbraudhe S R, *Water Resources Engineering,* S K Kataria & Sons, New Delhi 2012

ReferencesBooks

1. Bharat Singh: *Irrigation Engineering*
2. Gurcharan Singh: *Irrigation Engineering,* Standard Book House
3. Garg S. K.: *Irrigation Engineering & Hydraulic Structures*

Semester VII
ROCK MECHANICS

Course code: ECE706	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To bring awareness to the Civil Engineering students about the engineering properties of rocks.

Unit I **(Lecture 08)**

Introduction: Rocks Mechanics - its scope & importance; Application in Civil engineering problems.

Classification of rocks: Geological & lithological classifications; Terzaghis's classification; RQD classification of rock masses; Engineering classification of rocks; Geomechanics classification (RMR); Applications of rock mass classification.

Rock exploration: Objective; Geophysical exploration methods - Seismic methods, electrical resistivity method, Gravity methods and magnetic methods.

Unit II **(Lecture 08)**

Engineering Properties of Rocks: Elasticity & Strength of rocks; Engineering behaviour of rock mass; Stress - strain curves; Effect of confining pressure &temperature; Failure of rock - Griffith's theory of fracture initiated in rock mass; Effect of anisotropy; Friction in rocks.

Unit III **(Lecture 08)**

Physical Properties of rocks: Definition & determination – Density, Porosity, Permeability and Water absorption.

Mechanical Properties of rocks: Definition & determination - Compressive strength, Elastic modulus, Tensile strength (Brazilian test), Abrasion Resistance test by using Los Angeles abrasion test machine, Attrition test by Deval's Attrition test machine, Impact test for toughness, Crushing strength test, Triaxial shear test.

Rock indices - Strength index, Point load strength index; Quality indices.

Unit IV **(Lecture 08)**

Field & In situ Strength test of Rocks: Necessity & requirement; In situ properties of rocks & common in situ tests - Field direct shear test, Field Triaxial strength test, Plate load test, Bore hole test; General structural & mechanical properties of rocks influencing the Civil engineering foundation -Heterogeneity**;** Anisotropy; Discontinuities.

Unit V **(Lecture 08)**

Methods of improving properties of rock masses – Grouting - Pressure grouting for dams & tunnels, consolidation grouting; Rock reinforcement; Rock freezing; Rock bolting - Principle of rock bolting, various types of rock bolting, application of rock bolting**.**

Text Books:

1. Hudson J A & Harrison J P, *Engineering Rock Mechanics- An Introduction to the Principles,* Oxford Pub.
2. Farmer I W, *Rock Mechanics*
3. Bell F G, *Engineering Geology & Geotectonics,*
4. Krynine, D P, & Judd,W R: *Engineering Geology & Geotectonics,* Mc-Graw Hill, New York

Reference Books

1. Jaejer and Cook: *Fundamentals of Rock Mechanics*
2. Stagg K. G. and Zienkiewicz O. C.: *Rock Mechanics in Engineering Practice*
3. Fairhurtz C.: *Design Methods in Rock Mechanics*

Semester VII
PRE-STRESSED CONCRETE

Course code: ECE 707	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: The main objective of this paper is to develop the understanding about the pre stressed system & strength and deflection of pre stressed concrete.

Unit I **(Lecture 08)**

Introduction to Pre-stressing Systems: Review of basic concepts and properties of materials; Tensioning devices; pre-tensioning and post-tensioning techniques; Fressynet, Magnel Blaton, CCL and other systems.

Unit II **(Lecture 08)**

Analysis of Rectangular & flanged beams (T-section, I-section); Load balancing concept; concentric tendons; eccentric tendons.

Unit III **(Lecture 08)**

Losses in Pre-stressed Concrete: Estimation of losses due to elastic deformation; Shrinkage; Creep relaxation in steel; Friction and anchorage slip.

Deflection of Pre-stressed Concrete Members: Factors influencing deflection; Short and long term deflection of uncracked members; Deflection of cracked beams; Code requirements.

Unit IV **(Lecture 08)**

Shear and Torsion in Pre-stressed Concrete Beams: Principal and shear stresses; Ultimate shear resistance; Design of reinforcements for shear and torsion.

Anchor Zone Stresses in Post-Tensioned Members: Stress distribution in the end blocks; Anchor zone reinforcement

Unit V **(Lecture 08)**

Design of Pre-stressed members- rectangular beams, simply supported slabs, concrete poles

Text Books:

1. Ramamurtham S, *RCC design*,Dhanpat Rai & publishing companies
2. Raju N. K.: *Prestressed Concrete*
3. Punmia B C, Ashok kumar Jain, Arun Kumar Jain, *RCC Design*, Laxmi Publications

Reference Books:

1. Guyon: *Prestressed Concrete*
2. Mallick and Gupta: *Prestressed Concrete*

Semester VII
REMOTE SENSING APPLICATIONS

Course code: ECE708	L	T	P	C
	3	0	0	3

Objective: To make the students aware about the advanced technology of surveying i.e. Remote Sensing & its application in Civil Engineering

Unit I **(Lecture 08)**

Principles of Remote Sensing: Definitions; Electro-magnetic Remote Sensing; Data acquisition and analysis; Energy sources and Radiation sources

Unit II **(Lecture 08)**

Systems of Remote Sensing: Photographic Systems - General, Films and their sensitivity – Black and White, Colour and Infra-red;

Aerial Cameras: Single lens and multi lens; Strip and Panchromatic types; Aerial Photography – Types, Scale and Resolution.

Scanning Systems: Passive and Active systems; Aircraft and Satellite based Systems; Microwave Scanning Radiometers; Multi-spectral Scanners; Satellite-based Systems - Landsat, SPOT, IRS & IKONOS.

Unit III **(Lecture 08)**

Data Interpretation: Introduction – Satellite imagery data interpretation; Topographical Mapping; Stereo Parallax Measurements; Examples.

Unit IV **(Lecture 08)**

Remote Sensing Applications in Regional Planning: General; Use in regional planning and development and Urban Development.

Unit V **(Lecture 08)**

Remote Sensing applications in Highway Engineering Projects; Water Resources and Environmental Engineering.

Reference Books:

1. Wolf: *Elements of Photogrammetry*
2. Sabins Floyd F. Jr.: *Principles and Image Interpretation*
3. Lillesand and Keifer: *Remote Sensing and Image Interpretation*
4. Kennie T. J. M.: *Remote Sensing in Civil Engineering*

Semester VII

INDUSTRIAL POLLUTION CONTROL & ENVIRONMENTAL AUDIT (LAB)

Course code: ECE 753	**L**	**T**	**P**	**C**
	0	**0**	**4**	**2**

1. To determine the percentage of ammonia nitrogen in fertilizer.
2. To Measure the wind speed by Anemometer.
3. To Measure the Sound level meter by sound meter.
4. To determine the conductivity of given sample.
5. To determine the amount of oxalic acid and sulphuric acid in 1 L of solution.
6. To determine the amount of ammonia in given sample of water.
7. To determine the total suspended particles in water sample
8. Bacteriological test (MPN Test)
9. Determination of dissolved oxygen compulsory
10. Design of individual unit of water or waste water treatment

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VII
IRRIGATION ENGINEERING & HYDROLOGY (LAB)

Course code: ECE 755	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. To design the diversion head works
2. To design vertical drop weir
3. To design aqueduct
4. To design siphon aqueduct
5. To design super passage
6. To design siphon
7. To design canal head regulator
8. Site visit to canal system
9. Site visit to storage headwork

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VII
ROCK MECHANICS LAB

Course code: ECE 756	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. To determine bulk density of rock specimen (Bulk density).
2. To determine water absorption capacity of dry rock specimen (immersion test).
3. To determine uniaxial compressive strength of a rock specimen.
4. To determine tensile strength of a rock specimen (Brazillian Test)
5. To determine shear strength of bar shaped rock specimen.
6. To determine abrasive resistant of building stone using Los-Angeles' Abrasion Machine.
7. To determine abrasive resistant of rocks used as aggregate using impact pendulum.
8. To determine crushing strength of a rock using compression testing machine.
9. To determine the hardness of rocks sample using Deval's Attrition test machine (Attrition test).
10. To determine the toughness of a given rock sample using Impact test machine (Impact test).
11. To conduct cylinder splitting test for tensile strength of rock specimen.

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VII
PRE-STRESSED CONCRETE (LAB)

Course code: ECE 757	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. To design pre-stressed rectangular beam.
2. To design pre-stressed simply supported slab.
3. To design pre-stressed concrete pole
4. To study the various techniques of pre-stressing
5. To study the various systems of pre-stressing
6. To Study the various losses in pres-stressing
7. To study the short term deflection of pre-stressed concrete members.
8. To study the long term deflection of pre-stressed concrete members.
9. To study the shear and torsion in pre-stressed concrete beam.

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VII
REMOTE SENSING APPLICATIONS (LAB)

Course code: ECE 758	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. Visual interpretation of satellite images
2. Interpretation of different resolution IRS satellite images – LISS III, PAN and WIFS
3. Interpretation of cultural details from IRS image
4. Determination of photo scale
5. Visual interpretation of satellite images and aerial photographs
6. Study of SOI topographic sheets
7. Base map preparation
8. Unsupervised classification
9. Supervised classification

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VII
INDUSTRIAL TRAINING

Course Code: ECE791	**L**	**T**	**P**	**C**
	0	**0**	**0**	**3**

Students will have to undergo industrial training of six weeks in any industry or reputed organization after the VI semester examination in summer. The evaluation of this training shall be included in the VII semester evaluation.

The student will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified before the end of the VI semester and shall be the nodal officer for coordination of the training.

Students will prepare an exhaustive technical report of the training during the VII semester which will be duly signed by the officer under whom training was undertaken in the industry/ organization. The covering format shall be signed by the concerned office in-charge of the training in the industry. The officer-in-charge of the trainee would also give his rating of the student in the standard University format in a sealed envelope to the Director of the college.

The student at the end of the VII semester will present his report about the training before a committee constituted by the Director of the College which would comprise of at least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.

The marks by the external examiner would be based on the report submitted by the student which shall be evaluated by the external examiner and cross examination done of the student concerned.

Not more than three students would form a group for such industrial training/ project submission.

The marking shall be as follows.

Internal: 50 marks
By the Faculty Guide - 25 marks
By Committee appointed by the Director – 25 marks

External: 50 marks
By Officer-in-charge trainee in industry –25 marks
By External examiner appointed by the University – 25 marks

Semester VII
PROJECT WORK PHASE-I
(SYNOPSIS, LITERATURE SURVEY & PRESENTATION)

Course Code: ECE799

L	T	P	C
0	0	6	3

A group of students, not more than three, will be assigned a faculty guide who would be the supervisor of the student. The faculty would be identified in the starting of the VII semester.

The group will carry out the literature search and collect required material for carrying out the project.

The group will prepare a report not exceeding15 pages at the end of semester.

The assessment of performance of students should be made at least twice in each semester i .e. VII and VIII. In this semester, the student shall present the progress of project live as also using over heads projector power point presentation on LCD to the internal committee as also the external examiner.

The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.

The marking shall be as follows.

Internal: 100 marks
By the Faculty Guide - 50marks
By Committee appointed by the Director – 50 marks

Semester VIII

COMPUTER AIDED DESIGN (CAD)

Course code: ECE 801 **L T P C**

3 0 0 3

Objective: The main objective of this course is to train the civil Engineering students in Computer aided design and their programming.

Unit I **(Lectures 08)**

Introduction and Review of Computer Programming: Introduction to CAD/CAE, Element of CAD, concepts of integrated CAD/CAM, CAD Engineering application, its importance & necessity. Introduction of engineering drawing, projections (first angle & third angle), Isometric Views, Orthographic views with top, front, side views. One point, two point, three point Perspective view. Computer Graphics I: Computer system, graphics input device- cursor control devices, Digitizers, scanners, speech oriented devices and touch panels, Graphics display devices –CRT, colour CRT monitors, DVST, Flat –panel display ,Graphics output Devices. Computer application in analysis & design of civil engineering systems

Unit II **(Lectures 08)**

Geometric Transformations: word/device co-ordinate representation, 2D and 3D geometric transformations, concatenation programs.

Introduction to AutoCAD :History, Exploring GUI, Workspaces, Co-ordinate systems, Sheet sizes A0, A1, and A2…….,Sheet layout, Types of lines & their uses, Drawing settings – Units, Limits, Drawing simple sketches using Line, Circle, Arc, Ellipse, Polygon, Rectangle, Dynamic Input, Drafting settings, Editing commands – Erase, Oops, Undo, Redo, Move, Copy, Rotate, Array, Mirror, File Management - New, Q new, Open, Save, Save as, Close, Exit, Quit.

Unit III **(Lectures 08)**

Editing commands – Fillet, Chamfer, Scale, Stretch, Offset, Break, Drawing settings, Trim, Extend, Isometric View, Isoplane, Join, Solid, Donut, Fill, Fillmode, Revcloud, Object Selection Methods, Select, Qselect, Annotations - Text, Style, Mtext, Scale text, Spell, Table, Tabledit, Object Properties - Color, Linetype, Ltscale, Lineweight, Properties, Matchproop, Display Control - Zoom, Pan, Orbit Toolbar, Workspace settings, Layer Management, Adding / Removing Layers.

How to work with layers, Hatching utilities - Bhatch, hatch, hatchedit, superhatch, Inquiry commands - Id, Dist, List, Radius, Angle, Area, and Volume, Lengthen, Construction lines - Xline, Ray, Elevation, Section & staircase concepts, Standard sizes of doors, windows, ventilators, stairs.

Unit IV **(Lectures 08)**

Dimension - Linear, Aligned, Radius, Diameter, Center Mark, Angle, Arc length, Continuous, Baseline, Tolerance, Dimension Space, Dimension Break, Inspection, Jogged radius, Ordinate dimensions, Leader, Qleader, Mleader, Multileader style, Dimedit, Ddedit, dimtedit, Dimension Associative, Dimension Style, Wipeout, region, boundary, filter, group, Cal, Block, Wblock, insert. Parametric drawings: Geometric constraints, Dimensional constraints, Divide measure, Runscript, X plode. View & visual styles Toolbar, polysolidwalls, cylinders, box, torus, wedge, cone, frustum cone,sphere, pyramid, helix. Element of computer Aided design & its advantage over conventional design. Hardware requirement for CAD works

UNIT V **(Lectures 08)**

Advance 3d tools:-,Extrude, presspull, sweep, loft, revolve, union, subtract, intersect,3d move,3drotate,3d array, Autocad design (Adc), Mocoro, Introduction to plotting, Page setup, Plot Styles, Introduction to plotting, Page setup, Plot Styles.

Text Books:

1. Hearn & Baker, Pearson, *"Computer Graphics"*, Prentice Hall of India Pvt Ltd
2. R.K.Srivastava, *"Computer Aided Design"*,. Prentice Hall of India Pvt Ltd
3. Ibrahim Zeid, CAD/CAM Theory and Practice, Mc Graw Hill International Publ.

Reference Books:

1. Foley, Van Dam, Feiner, *"Computer Graphics –Theory & Practice"*, Pearson Education
2. Ibrahim Zeid, *"CAD/CAM Theory and Practice"*, Mc Graw Hill International
3. Rao & Dukkipati, *"Computer Aided Analysis & Design of Machine Elements"*,
4. Rogers & Adams, *"Mathematical Elements for Computer Graphics"*, Mc Graw Hill
5. Groover & Zimmers, *"CAD/CAM"*, Prentice Hall of India Pvt Ltd
6. Rajaraman , *"Computer Oriented Numerical Methods"*, Prentice Hall of India Pvt Ltd
7. Rajeev S, *Computer Aided Design,* Narosa Publications

Semester VIII

ADVANCED COMPUTER AIDED DESIGN (CAD)

[ECE 810 amended vide approval dt. Jan 11, 2017 of V.C]

Course code: ECE 810 **L T P C**

3 0 0 3

Objective: The main objective of this course is to provide students fundamental concepts of finite element analysis and the use to STADD Pro in design of basic structural elements.

UNIT I **(Lectures 08)**

Introduction STAAD PRO and STAAD EDITOR concept of integrated CAD, CAD Engineering application, its importance and its necessity. Introduction of Engineering Drawing, projection (1st angle & 3rd angle), Isometric view, Orthographic views with top, front, side views. One point, two points, there points perspective views.

UNIT II **(Lectures 08)**

Computer application in analysis and design of civil engineering system, Introduction to Finite element method (FEM), Application, displacement/ stiffness matrix, Analysis of one dimensional and two-dimensional bar element, Beam and Truss element.

UNIT III **(Lectures 08)**

Introduction to CAD, element of CAD, Element of STAAD PRO and its advantages over conventional method, unit, creating nodes, creating members, assign fix support, creating load case, applying self-weight, adding U.D.L & point load and analyses of loads.

UNIT IV **(Lectures 08)**

Design and optimization of structure engineering package –principal of design of steel and RC structure,

General guideline for concrete design as per Indian codes, concrete design using staad pro.

UNIT V **(Lectures 08)**

Introduction and history of AUTODESK 3DS-MAX, explain the process to create the furniture and product i.e. - table, sofa, bed, light lamp etc

Explain the process for applying the material on object, explain the process of rendering.

Learning Outcomes:

1. To obtain an understanding of the theory governing the structural behavior of various elements like bar, beam and truss using Finite Element Analysis (FEA).
2. It will enable Student to perform design optimization for basic structural members using STADDPRO.

Text Books:

1. S.S Bhavikatti" Finite Element Analysis",New Age International Publication
2. R.K.Srivastava, "Computer Aided Design",. Prentice Hall of India Pvt Ltd
3. Ibrahim Zeid, CAD/CAM Theory and Practice, Mc Graw Hill International Publ.

Reference Books:

1. Foley, Van Dam, Feiner, "Computer Graphics –Theory & Practice", Pearson Education
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", Mc Graw Hill International
3. "Max for Engineers / Architects", "AutoDesk", "Reference Guide", "CADD CENTRE"
4. "STAAD.Pro V8i","Bentley Sustaining Infrastructure", "Reference Guide", "CADD CENTRE
5. Rao & Dukkipati, "Computer Aided Analysis & Design of Machine Elements",
6. Rogers & Adams, "Mathematical Elements for Computer Graphics", Mc Graw Hill

7. Groover&Zimmers, “CAD/CAM”, Prentice Hall of India Pvt Ltd
8. Rajaraman, “Computer Oriented Numerical Methods”, Prentice Hall of India Pvt Ltd
9. Rajeev S, Computer Aided Design, Narosa Publications

***Latest editions of all the suggested books are recommended.**

Semester VIII
PROJECT MANAGEMENT

Course code: EHM 802	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To impart knowledge of project management to the students.

Unit I **(Lectures 08)**

Fundamental Topics: Introduction to Project Management and Corporate Planning Process; Corporate Financial Objectives; Issues in Shareholder Wealth Maximization; Time Value of Money; Future Value and Present Value of Multi-period Cash Flow; Interest Rate; Cost of Capital.

Unit II **(Lectures 06)**

Concept Stage: Strategic Investment Decisions and Project Ideas; Project Feasibility Study; Demand Forecasting Techniques; Project Financing; Forms of Business Organization.

Unit III **(Lectures 10)**

Analysis Stage: Cost-Benefit Analysis - Cash Flow Projections; Financial Analysis - Capital Budgeting Evaluation Techniques; Required Rate of Return from Projects; Economic and Social Cost-Benefit Analysis with Environmental Appraisal; Project Portfolio Risk; Project Risk Analysis; Framework of Project Risk Management.

Unit IV **(Lectures 08)**

Planning, Execution and Completion Stage: Introduction to PERT & CPM; Allocation of Limited Capital - Capital Rationing; Project Planning and Control; Network Analysis and Execution Plan; Project Execution and Control; Post Completion Audit (PCA).

Unit V **(Lectures 08)**

Special Topics: Inflation and Project Investment; Economic Life of Projects and Replacement Policy; Infrastructure Projects; International Capital Budgeting.

Text Book:

Bhavesh Patel, Project Management -Financial Evaluation with Strategic Planning, Networking and Control, Vikas Publishing House Pvt Ltd, New Delhi

Semester VIII
COMPUTER AIDED DESIGN (LAB)

Course code: ECE 851	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. To Study the Auto CAD & how can we use its tools in drawing
2. To draw the given diagram using Absolute Co-ordinate system
3. To draw the given diagram using Relative Co-ordinate system
4. To draw the given diagram using Polar Co-ordinate system
5. Apply the mirror command for the given object
6. Draw the inscribed polygon & circumscribed polygon
7. Apply the array command for the given object
8. Make the one room plan with verandah in 3 dimensions
9. Draw the isometric view from the given drawing
10. Insert the material given in 3 D drawing

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4-point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII

ANALYSIS AND DESIGN (LAB)

[ECE 860 amended vide approval dt. Jan 11, 2017 of V.C]

Course code: ECE 860 **L T P C**

0 0 3 1.5

Objective: The main objective is to enable students to draw shear force and bending moment diagram for different structural component using computers.

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1. To prepare shear force diagram and bending moment diagram of a simply supported beam in which point load is applied at midpoint.
2. To prepare shear force diagram and bending moment diagram of a simply supported beam in which point load is applied at point "A" located at a distance of "x" from left joint.
3. To prepare shear force diagram and bending moment diagram of a simply supported beam in which U.D.L is applied over the entire length of beam.
4. To prepare shear force diagram and bending moment diagram of a simply supported beam in which U.D.L is applied over the defined portion of beam.
5. To determine the stress and deflection of a cantilever beam in which point load applied at midpoint of cantilever beam
6. To determine the stress and deflection of a cantilever beam in which point load applied at outer end point of cantilever beam
7. To determine the stress and deflection of a cantilever beam in which U.D.L applied over the entire length of beam.
8. To determine the stress and deflection of a cantilever beam in which U.D.L applied over the only length of cantilever portion of beam.
9. To create a furniture object using AUTODESK 3DS-MAX with wooden finish i.e. - dining table with 6 chairs.
10. To create a 3seater sofa with centre table by using AUTODESK 3DS –MAX with Rendering.

Learning Outcomes:

Students will be able to calculate the SFD and BMD under different loading condition and it will further enable them to calculate the stress and deflection in the structural member under analyses

Evaluation Scheme of Practical Examination:

Internal Evaluation (50 marks)

Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 -point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)

The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII
HYDRO POWER ENGINEERING

Course code: ECE802	L	T	P	C
	3	0	0	3

Objective: To train the students in Power Resource technology & management.

Unit I **(Lectures 08)**

Introduction: Power resources, Need & advantages, Estimation of Hydropower potential. Calculations for estimation of electrical load on turbines. Load factor, peak demand and utilization factor load duration curve, Prediction of load.

Unit II **(Lectures 08)**

Classification of Hydropower Plant: General Management of running of river plants. Storage, diversion, canal plants, valley dam plants. Pumped storage plants, advantages & disadvantages, types. Tidal Power Plants.

Unit III **(Lectures 08)**

Powerhouse: Components, Structural details of powerhouse.

Unit IV **(Lectures 08)**

Penstocks: Classification, design criteria, water hammer phenomenon, surge tanks, design procedures & detailed classification, canal surges.

Unit V **(Lectures 08)**

Turbines: Selection, classification, Arrangements in powerhouse. Draft tubes, cavitation. Governing of turbines. Design principles of impulse & reaction turbines. Design of micro hydropower plants.

Reference Book:

1. Dandekar *"Water Power Resources Engineering"*,

Semester VIII
GIS APPLICATIONS

Course code: ECE 803

L	T	P	C
3	0	0	3

UNIT –I **(Lectures 08)**

Fundament of GIS: GIS Database, the real world vs GIS, Data model- vector model, spatial model & topology model; Raster model; Conversion of raster into vector data (vectorization), Advanced of models –DEM/DTM

GIS process- Data input, manipulation, management, query& Analysis & Visualization.

UNIT-II **(Lectures 08)**

Projection and Coordinate systems: Coordinates, Geographic reference, datum, Projection, Types of map projection, cylindrical, Conic & Azimuthal projection Modeling the spatial object & feature; spatial registration; Metadata; Data Standards; Maps & Themes- Map symbols, colour, text, layout &thematic representation

UNIT-III **(Lectures 08)**

Database Management systems: spatial & no spatial data (Attribute data) Data capture, Data representation data integration, data analysis & modeling, Main organization in the computer,

UNIT-IV **(Lectures 08)**

Spatial Analysis, Overlay analysis, Buffering Reclassification & Rebuilding; Shape & Measurement Analysis, Surface Analysis, Surface Models GIS & the internet.

UNIT-V **(Lectures 08)**

Application of GIS: Land use/Land cover, Change Analysis; Cadastral surveying; Natural resources Management; Disaster Mitigation Programmes, Water resources management, Water shed management environment change detection etc.

Text Books

1. Burrough PA & RA Mc Donnell *Principles ofGIS, Oxford University Press.* 1998
2. Clarke, Keith C., Bradley O. Parks, and Michael P. Crane. *Geographic Information Systems and Environmental Modeling*, Upper Saddle River, NJ: Prentice Hall, 2002.
3. Albert, Donald P., William M. Gesler, and Barbara Levergood, *Spatial Analysis, GIS, and Remote Sensing Applications in the Health Sciences,* Chelsea, MI: Ann Arbor Press, 2000.

Reference Books

1. Burke, Robert. *Getting to Know Arc Objects: Programming ArcGIS with VBA*, Redlands, CA: ESRI Press, 2003.
2. ESRI Map Book: Volume 20, Redlands, CA: ESRI Press, 2005.
3. Gatrell, Anthony and Markku Loytonen, eds. GIS and Health, Philadelphia: Taylor and Francis, Inc., 1998.

Semester VIII
UNDERGROUND STRUCTURES AND TUNNELS

Course code: ECE 804	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To train the civil Engineering students in geology and geological considerations for tunneling and other underground structures.

Unit I **(Lectures 08)**

Introduction to Tunneling: Fundamental definitions, tunneling art and engineering, historical development Geological aspects of tunneling: Geological investigation, evaluation and appreciation, importance of geological knowledge, aim of geological investigation, principal elements of exploration programme, Influence of geological conditions on design and construction of tunnels

Unit II **(Lectures 08)**

The Geological Environment: Igneous, sedimentary and metamorphic rocks, Rock alteration, rock mass deformation by folding action, faults: characteristics and influence on tunneling, joints and their relevance to tunneling, groundwater aspects, squeezing and swelling ground conditions, gases in rocks. Rock temperatures, sloping ground surface conditions, tunneling in soft ground, classification of soft ground tunneling conditions, rock burst phenomena in tunnels.

Unit III **(Lectures 08)**

Tunneling Methods I: Soft ground conditions, Shield Tunnels, Advantages of shield tunneling, Conventional Tunneling Shields, Open Shield, Closed and Half Shields, Special Features of Shield Tunneling, excavation, Shield control, Settlement, Pipe Jacking, Special Shield Tunneling Methods, The D.K. Shield, Slime shields, Earth Pressure Balance Shield, Slurry-shield tunneling,

Unit IV **(Lectures 08)**

Tunneling methods II: Rock conditions using drill and blast Influence of rock strength on excavation, influence of tunnel size, summary of drilling and blasting method of tunnel excavation drilling blasting debris clearance, ground support drilling and blasting: basic operations, tunnel excavation using explosives, blasting cuts, minimizing ground vibrations, blasting with non-electric initiation, improved blasting efficiency, rock drill ability factors, percussive drilling, mechanism of rock breakage, smooth profile blasting, computer-aided drilling, tunneling progress with drill and blast excavation.

Unit V **(Lectures 08)**

Ground treatment in tunneling: Ground control; general appreciation, weak cohesion less soils: water and instability problems, ground treatment methods, dewatering using well bores electro-osmosis, grouting, ground freezing, investigation procedures, consolidation grouting, compaction grouting, jet grouting

Test Book

1. Ramamurthy T, " *Engineering in Rocks for Slopes, Foundations & Tunnels,* PHI Learning, New Delhi

Semester VIII
BRIDGE ENGINEERING

Course code: ECE 805	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To develop the skill among the civil Engineering students about the bridge Engineering which includes the selection of type of bridge, design and load etc.

Unit I **(Lectures 8)**

Introduction to Bridge Engineering (History, Bridge Types, and Failures)
Selection of Bridge Types, Aesthetics, General Bridge Design Considerations, and Preliminary Design
Design preliminaries: Layout, types of loads including wind and seismic loads, standard specifications for road bridges, substructures, superstructures, IRC provisions on loads and stresses, specification for single/double multi lane railway and road bridges.

Unit II **(Lectures 8)**

Design Loads, Load Factors, Load Combinations, and AASHTO Vehicle Loads
System Analysis and Evaluation (Load Analysis), Prestress Losses
Deck and Deck Systems

Unit III **(Lectures 8)**

Concrete Bridge Design – Reinforced Concrete and Prestressed (Response and Limit States)
Prestressed Girder Bridge Design, Prestressing and Partial Prestressing
Steel Bridge Design (Response and Limit States), Tension and Compression Members
I-sections in Flexure

Unit IV **(Lectures 8)**

Steel Bridge Design Shear Resistance of I-sections, Shear Connectors, and Stiffeners
Design Examples using 2007 AASHTO LRFD Specifications
Steel Bridge Design (Fatigue and Fracture),

Unit V **(Lectures 8)**

Detailing Bearings and Foundation Design, Segmental Bridges and Construction
Abutments, Piers, and Walls; Seismic Analysis and Design
Seismic Analysis and Design
Bridge Inspection and Maintenance

Text Books:

1. .Raju N.K, *"Design of bridges"*, Oxford & IBH Publishing Co. Pvt. Ltd.
2. .Victor D.J, *"Essentials of Bridge Engineering"*, Oxford & IBH Publishing Co. Pvt. Ltd.

Reference Books:

1. *IRC Standards (IRC 37 - 2001 & IRC 58 -1998)*
2. *Bureau of Indian Standards (BIS) Publications on Highway Materials*
3. *Specifications for Road and Bridges, MOST (India)*

Semester VIII
RAILWAY ENGINEERING

Course code: ECE 806

L	T	P	C
3	0	0	3

Objective: To train the civil engineering students in Railway Engineering which includes mainly design of rail tracks, sleepers etc

Unit I **(Lecture 08)**

Introduction: Development and classification of Indian Railways; Rails – Function, Composition and requirement of rail section - Comparison of sections, Length, Welding, Expansion and length of welded rails, Corrugated rails, Hogged rails, Buckling of rails, Creep of rails, Wear on rails, Rail joints

Sleepers: Functions and requirements of sleepers, Classification of sleepers; Timber, Metal, Concrete – R.C.C. and prestressed concrete sleepers, Spacing of sleepers and sleeper density

Ballast: Functions and requirements of ballast, Types of ballast, Size and section of ballast, Rail Fixtures and Fastenings :Purpose and types, Fish plates, Spikes, Bolts, Chains, Blocks, Keys, Bearing plates, Check rails and Guard rails

Unit II **(Lecture 08)**

Formations and Subgrade: Formation width requirement and sub grade improvement; drainage; rail embankment stability

Geometric Design of Rail Tracks: Cross-section, Gradients, Speed, Radius of curve, Super elevation, Maximum and Minimum super elevation, Equilibrium super elevation, Absolute minimum and ruling minimum radii, Cant deficiency, Negative super elevation

Unit III **(Lecture 08)**

Points and Crossing: Turnouts, Points and switches, Crossing number and angle of crossing, types of track junctions, Design calculations of turnout. Design of diamond crossing and cross-over

Unit IV **(Lecture 08)**

Station yard Layout: Railway Station – Types; Sidings, Marshalling and Loco Yards

Unit V **(Lecture 08)**

Signalling: Object and Principles of signalling, classification of signals

Interlocking: Necessity and functions of interlocking. Traction and Tracting resistance

Reference Books:

1. Vaswani N. K. *Railway Engineering*
2. Saxena and Arora: *A Text Book of Railway Engineering*

Semester V
GROUND WATER ENGINEERING

Course Code: ECE 807	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

OBJECTIVE
Develop an understanding for solving basic hydrogeological problems related to Ground water quality and development of ground water methods are dealt.

UNIT I **(Lecture 08)**
Fundamentals Of Ground Water- Introduction, Characteristic of Ground water , Distribution of water , Physical Properties of Porous Media, Aquifers and Aquifers Types, Permeability, Darcy's Law - Types of aquifers, water level fluctuations.

UNIT II **(Lecture 08)**
Hydraulics Of Flow Aquifer Storativity, Effective Stress, Compressibility, Terzaghi's Principle, Consolidation, Homogeneity and Isotropy, Hydraulic Gradients, Permeameters, Variable Density, Saline aquifers,• Geology and Groundwater Flow

UNIT III **(Lecture 08)**
Hydrologic Cycle & Water Balance- Elements of Hydrologic Cycle,• Equations of Groundwater Flow , Steady - State Analytical Solutions, Flow Nets, Pumping test - Unsteady state flow ,Thiess method , Jacob method

UNIT IV **(Lecture 08)**
Ground Water Development -Infiltration gallery, Conjunctive use, Artificial recharge, Rainwater harvesting, Safe yield , Yield test, Geophysical methods , Selection of pumps.

UNIT V **(Lecture 08)**
Water Quality -Ground water chemistry - Origin, movement and quality - Water quality standards – Saltwater intrusion –Environmental concern

TEXT BOOKS
1. Raghunath H.M., *"Ground Water Hydrology",* Wiley Eastern Ltd., 2000.
2. Todd D.K., *"Ground Water Hydrology",* John Wiley and Sons, 2000.

REFERENCE
1. C Walton, *"Ground Water Resource Evaluation",* McGraw-Hill Publications.

B. Tech. Semester VIII
CONSTRUCTION PRACTICES IN DIFFICULT GROUND CONDITIONS

Course code: ECE 808	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To train the civil Engineering students in construction practices in difficult ground conditions.

Unit I **(Lectures 08)**
Construction Management – Network techniques – introduction – Bar charts – use of CPM and PERT for planning – time estimates – critical path – updating – crashing – resource smoothing – resource leveling – computer applications

Unit II **(Lectures 08)**
Construction planning: Preparation of job layout – labour schedule – material schedule-equipment schedule Construction
Methods – Tender – earnest money deposit – security deposit – contract – contract documents – measurements – completion certificate – inspection and quality control – standardization – organizations at national and international level (BIS & ISO) – role of certification

Unit III **(Lectures 08)**
Construction equipment – Equipment for excavation and transportation of earth – hauling equipment – hoisting equipment – pile driving equipment

Unit IV **(Lectures 08)**
Quantity surveying - preparation of detailed estimates for: buildings - reinforced concrete structures and steel structures - roads - irrigation structures - sanitary and water supply works

Unit V
Preparation of specification for common materials of construction and items of work as per IS - analysis of rates and preparation of abstract of estimate.
Introduction to valuation of real properties: Depreciation – Sinking fund – methods of valuation

Text Books:
1. Vazirani V.N. & Chandola S.P., *"Heavy Construction"*,
2. Jha J. & Sinha S.K., *"Construction & Foundation Engineering"*, Khanna Publications

Reference Books:
1. Verma L.C., *"Standardisation - A New Discipline"*,
2. Rangwala, *"Valuation of Real Properties"*,
3. Peurifoy R.L., & Ledbetter W.B., *"Construction Planning Equipment & Methods"*,
4. Chakrabarthi, *"Costing, Specification in Civil Engg"*,
5. Shah N.A., *"Quantity Surveying & Specification in Civil Engg."*,
6. *"Methods of Measurement of Building & Civil Engg"*. I.S 1200 (1968), Works
7. Mahajan S.P., *"Civil Estimating & Costing"*,

Semester VIII
PAVEMENT DESIGN

Course code: ECE 809	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Objective: To train the civil Engineering students in pavement designing.

Unit I **(Lecture 08)**
Introduction: Types of Pavement and structure: Flexible pavement; Rigid Pavement

Unit II **(Lecture 08)**
Survey, Investigations and General Consideration: Road Survey, Formation, Width of pavement, Camber, Gradient, Super elevation, Design speed, Road Cross-section, Tests of road materials: Soil, gravel, sand cement, concrete, Bitumen, CBR test, and other tests required as per IS & IRC Codes.

Unit III **(Lecture 08)**
Design of Flexible Pavement: Elements of Flexible pavement; methods of design CBR method; other methods sub grade , sub base, base, WBM, BM, BUSG, Premix, carpet, SDBC, Road shoulders; Relevant IRC, Codes of Practice

Unit IV **(Lecture 08)**
Design of Rigid Pavements: Elements of Rigid pavements; Methods of design; Stresses in rigid pavements and stress combinations; Sub-grade reaction; Joints in concrete pavements; Concrete Mix Design; Relevant IRC Codes of Practice

Unit V **(Lecture 08)**
Road Drainage: Necessity of drainage; Surface drainage; Sub-soil drainage; Road-side drains: Open and covered types.

Text Books:

1. Khanna S K and Justo C E G, *"Highway Engineering"*, Nem Chand and Bros, Roorkee, 2001
2. Bindra S P,*"A course in Highway Engineering"*, Dhanpat Rai Publications, New Delhi 1999

Reference Books:

1. Khanna S. K. & Justo, C. E. G. : *Highway Engineering,* Nem Chand and Bros, Roorkee,
2. Vaswani N. K. : *Highway Engineering*

Semester VIII
GIS Applications (LAB)

Course code: ECE 853

L	T	P	C
0	0	3	1.5

1. Familiarisation with ARC GIS software
2. Input of data in GIS (after Scanning)
3. Georeferencing in ARC GIS
4. Digitization and layer creation
5. Data editing and topology creation
6. Editing the layers (use of snap tolerance, remove over lap, gaps etc.)
7. Non spatial data entry
8. Linking spatial and non spatial data
9. Create new table, add field to table, add record to table, calculate area, perimeter
10. Buffer analysis
11. Overlay of the maps
12. Querry analysis

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII
RAILWAY ENGINEERING (LAB)

Course code: ECE 856	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. Typical cross section of railway track in cutting & filling BG single line
2. Cross section of BG railway track double line both in cutting & filling
3. Left hand turn out crossing showing all components
4. To draw the cross of rail
5. To determine the abrasion value of coarse aggregate
6. To determine the soundness of aggregate
7. To determine the specific gravity of aggregate
8. To determine the impact value of aggregate

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII
PAVEMENT DESIGN (LAB)

Course code: ECE 859	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

1. Calculation of percentage bitumen in bitumen concrete.
2. Flash & fire point test of Bituminous sample.
3. Ductility Test of bitumen sample
4. Softening point test of bitumen.
5. Penetration test of bitumen sample
6. Specific gravity of Aggregate for road
7. Soundness of Aggregate for road
8. Impact value test of Aggregate for road
9. Crushing value test of aggregate for road
10. Los Angeles abrasion test of aggregate for road.

Evaluation Scheme of Practical Examination:
Internal Evaluation (50 marks)
Each experiment would be evaluated by the faculty concerned on the date of the experiment on a 4 point scale which would include the practical conducted by the students and a Viva taken by the faculty concerned. The marks shall be entered on the index sheet of the practical file.

Evaluation scheme:

PRACTICAL PERFORMANCE & VIVA DURING THE SEMESTER (35 MARKS)				ON THE DAY OF EXAM (15 MARKS)		TOTAL INTERNAL (50 MARKS)
EXPERIMENT (5 MARKS)	FILE WORK (10 MARKS)	VIVA (10 MARKS)	ATTENDANCE (10 MARKS)	EXPERIMENT (5 MARKS)	VIVA (10 MARKS)	

External Evaluation (50 marks)
The external evaluation would also be done by the external Examiner based on the experiment conducted during the examination.

EXPERIMENT (20 MARKS)	FILE WORK (10 MARKS)	VIVA (20 MARKS)	TOTAL EXTERNAL (50 MARKS)

Semester VIII
PROJECT WORK PHASE-II
(REPORT, ANALYSIS, IMPLEMENTATION/ SIMULATION & PRESENTATION)

Course Code: ECE899	**L**	**T**	**P**	**C**
	0	**0**	**18**	**9**

Students should devote themselves to make a project which preferably should be a working model of their thoughts based on their subject of choice.

The project shall be finalized by the students before the start of the VII semester and shall be completed and submitted at least one month before the last teaching day of the VIII semester, date of which shall be notified in the academic calendar.

The assessment of performance of students should be made at least twice in each semester i.e. VII and VIII and each internal assessment shall be for 25 marks. The student shall present the final project live as also using overheads project or power point presentation on LCD to the internal committee as also the external examiner.

The evaluation committee shall consist of faculty members constituted by the college which would comprise of at-least three members comprising of the Department Coordinator, Class Coordinator and a nominee of the Director. The students guide would be a special invitee to the presentation. The seminar session shall be an open house session. The internal marks would be the average of the marks given by each member of the committee separately in a sealed envelope to the Director.

The marking shall be as follows.

Internal: 50 marks
By the Faculty Guide - 25marks
By Committee appointed by the Director – 25 marks

External: 50 marks
By External examiner appointed by the University – 50 marks